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Audubon Field Notes

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ELEVENTH BREEDING-BIRD CENSUS

Volume 1, No. 6 November 1947

AUDUBON FIELD NOTES

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Cover photograph of climax beech-maple forest by Arthur B. Williams

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Symbols and abbreviations: P=pair; M=male, generally singing on a fixed territory throughout the season; UM=unmated male; F=female; N=pair with nest; Y=pair seen feeding young. Separated by commas, these figures represent a classified basis for the number of pairs of each species: crow, 2P, 4N, 4Y=10 pairs of crows.

ELEVENTH BREEDING-BIRD CENSUS

A TOTAL of 38 censuses are included this year. These cover a considerable variety of habitats and represent 17 states and provinces. The leading states in number of censuses submitted were Ohio with 9, Maryland with 6, Georgia with 4 and Michigan with 3. Reports on new areas include 4 from Georgia, 4 from Maryland, and one each from Alabama, Michigan, North Carolina, Virginia and San Luis Potosi.

Bird populations of certain sections of the country have been studied more intensively than those elsewhere. Strangely enough the North Atlantic and New England states are poorly represented, although there are probably more ornithologists in that part of the country than in any other. The West is even worse. Only 3 censuses were submitted from states west of the Mississippi river—and such a multitude of habitats to be covered. How about it, Westerners! Surely this situation can be improved.

More studies are needed on uniform habitats, including marsh, tundra, grassland, edge and forest. Mixed habitats are the least desirable of all since it is very difficult to interpret the significance of population data from them in our present state of knowledge. The only exception to this is when large areas of mixed habitat are studied and the data on the various habitats separated such as was done by L. H. Walkinshaw in his study of brushy field, woodlot and pond (Census No. 26).

Of special interest in this issue is A. B. Williams' 15-year summary of his study on a 65-acre tract of climax beech-maple forest. This is one of the finest and most complete bird population studies that has been done and could well serve as a model for others to follow. Let us hope that the number of such studies will be increased in the future.

Much of the credit for maintaining and expanding the general interest in breeding bird population studies should go to Margaret B. and Joseph J. Hickey, without whose perseverance, patience, and enthusiasm many of these studies might not have been made.

In this issue a number of minor changes have been made in the wording of titles in order that the various censuses would fit into the new classification of habitats that is being followed. The population figures for certain birds, especially polygamous species, were in some cases listed in terms of equivalent pairs (total number of adults divided by 2) rather than pairs. This is believed to permit a more accurate comparison of adult populations of polygamous species with those that are monogamous.—ROBERT E. STEWART.

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1. BUR-REED MARSH. A tract of marsh (17½ acres) with bur-reed growing on 88% of its area; located in Fairfield Township, Columbiana County, Ohio; fully described and first censused in 1944. COVERAGE: April 20, 27; May 4, 11, 18, 21, 25, 29; June 1, 4, 6, 15. Total, 68 hours. Raymond O. Marshall and William C. Baker aided in the survey. WEATHER: April, May, and June yielded a rainfall 6 inches above average. Heavy rain in June flooded some nests. Temperature for May and June below normal. CENSUS: Least bittern, 1P; mallard, 1P; Virginia rail, 10P (7N, 3P); sora, 1N; Florida gallinule, 1P; prairie marsh wren, 20P (15N, 5P); red-wing, 18P (15N, 3P); swamp sparrow, 10P (9N, 1P). TOTAL: 8 species, 62 pairs. DENSITY: 354 pairs per 100 acres (411 in 1944 and 1945, 394 in 1946). FREQUENT VISITORS: Black duck, 1P; wood duck, 1P; great blue heron, 1; green heron, 1P; American bittern, 1P; marsh hawk, 2P; killdeer, 1P; spotted sandpiper, 1P. Barn swallow, purple martin and chimney swift fed over the area. COMMENT: The total of both species and pairs in our area was lowered this year as a result of several pairs nesting in the marsh, but just outside our boundary. A marked decline in the water level at the lower end of the marsh is without explanation at this time—ALBERT T. HARTLEY, Columbiana, Ohio, and PAUL A. STEWART, Leetonia, Ohio.

2. VIRGIN PALOUSE PRAIRIE. Twelve miles south-by-west of Pullman, Washington (Sec. 29. T. 38 N., R. 44 E.W.M.). Altitude 2850 ft. Same area as last year. SIZE: 28.2 acres (exact area determined by plane-table mapping this year). COVERAGE: May 19, 27; June 5, 16, 24; July 8, 1947. About 17 hours afield. WEATHER: Clearer and drier than usual. Visibility uniformly good. VISITORS (1947): Swainson's hawk, mourning dove, red-shafted flicker, eastern kingbird, Arkansas kingbird, horned lark, barn swallow, rough-winged swallow, cliff swallow, robin, Bullock's oriole, black-headed grosbeak, Am. goldfinch. COMMENT: This area is typical of the Palouse Prairie, the only large prairie country west of the Rockies. Settlers took up the land in the eighties and breaking of the sod began immediately. There was little "pioneer" stage and little cattle raising, even though this was a grassland. Wheat became the principal crop and has remained so, but dry peas have become important in recent years. A sharp ridge cuts across the back corner of a ranch and the inconvenience of crossing it with heavy machinery has served to protect this sod area, the only one of size now left in the Palouse. It has been pastured in the past by horses, but not since caterpillar tractors replaced horses a score or more years ago. One or two errors in past reports are corrected in the summary:

	'42	'44	'45	'46	'47	Ave.	Ave. pairs per 100 acres
marsh hawk...	—	1	1	1	—	.6	2.1
ring-necked pheasant ...	—	1	1.5	—	1P	.7	2.5
short-eared owl.	1	—	—	—	—	.2	.7
Traill's flycatcher	5	2	2	2	2P	2.6	9.2
Macgillivray's warbler	4	6	6	4	3P, 1N 1Y	5.0	17.7
chat	—	—	—	—	1P	.2	.7
western meadowlark.	—	1	—	1	1P	.6	2.1
lazuli bunting..	7	5	6	8	4P, 2N 2Y	6.8	24.1
grasshopper sparrow	2	2	4	1	1P	2.0	3.9
vesper sparrow.	—	—	—	1	—	.2	.7
Brewer's sparrow	13	13	12	15	5P, 4N, 4Y	13.2	46.8
song sparrow..	3	1	4	2	2P, 1N	2.6	9.2
Total species.	7	9	8	9	9	8.4	
Total pairs..	35	32	36.5	35	35	34.7	
Density, pairs per 100 acres..	124	117	129	124	124	123	

VISITORS TO AREA DURING FIVE YEARS: Sharp-shinned hawk, Swainson's hawk, ferruginous rough-leg, mourning dove, red-shafted flicker, eastern kingbird, Arkansas kingbird, Say's phoebe, horned lark, rough-winged swallow, barn swallow, cliff swallow, Am. magpie, robin, yellow warbler, English sparrow, Bullock's oriole, black-headed grosbeak, house finch, Am. goldfinch, savannah sparrow.—LEONARD WING, State College of Washington, Pullman, Wash.

3. DRY MEADOW ON ISLAND IN RIVER. About 57% of the census area consists of a mixture of 4 species of grass, including some blue-grass *(Poa pratensis);* 43% is chiefly blue-grass with a few other grasses. A few patches of chicory *(Cichorium intybus)* and white sweet clover *(Melilotus alba)* are in the area, and thickets of shrubs consisting mostly of sandbar willow *(Salix longifolia)* are present in two small sections. Some other plants occurring in small numbers are: cinquefoil *(Potentilla canadensis),* Queen Anne's lace *(Daucus carota),* Canada thistle *(Cirsium arvense)* and joe-pye-weed *(Eupatorium purpureum).* About two-thirds of the boundary of the study area is bordered by the river, and the remainder by grassland with scattered trees and thickets. Nomenclature of plants from *Shrubs of Michigan* by Billington, and *Wild Flowers of the Northern States and Canada* by Quick. SIZE: 13.5 acres. LOCATION: Belle Isle in the Detroit River at Detroit, Michigan. The census area is located on the southernmost peninsula at the east end of the island. TOPOGRAPHY: Flat, elevation 580 ft. SURVEYS: Infrequent trips for 2 years. COVERAGE: May 4, 5, 6, 8, 9, 10, 13, 14, 16, 17, 18, 19, 20, 21, 23, 30; July 1, 8, 18, 22. Man-hours totaled 128 and time varied from 8 a.m. to 7 p.m. WEATHER: Winter was unusually warm and dry; spring months abnormally cool with third highest rainfall on record (75 years); June and July were about normal. CENSUS: Killdeer, 2P, 2N; spotted sandpiper, 1P, 34N, 3Y; prairie horned lark, 1Y; eastern meadowlark, 1N; cowbird, 1P (frequented the area regularly, 1Y raised successfully by savannah sparrows); savannah sparrow, 2P, 2N, 1Y; song sparrow, 1P, 4N, 4Y. Total: 7 species, 59 pairs. DENSITY: 437 pairs per 100 acres. REGULAR VISITORS: killdeer, mourning dove, flicker, chimney swift, purple martin, crow, starling, English sparrow, red-wing, and bronzed grackle. COMMENT: Possible enemies present besides those implied in the above report are: regularly—common tern, herring gull; rarely—blue jay. Thirty of the spotted sandpiper nests (out of 39 nests, including five just off the area) produced 74 young (left nest). —MR. and MRS. J. ROBERT MILLER, 1523 E. Jefferson, Detroit 7, Mich.

4. DAMAGED WHITE PINE—HEMLOCK—NORTHERN HARDWOOD FOREST. A tract of 50 acres of steep hillside culminating in a ridge with many outcropping ledges, located at Wells River, Vermont, and fully described in 1939. Censused in 1934, 1936 and continuously since 1939. The area is bounded on most of one side by a forest tract from which the timber was removed some 16 years ago. Other boundaries are an open pasture, a railroad right-of-way, and the Wells River. COVERAGE: June 4, 11, 20; July 6, 13, 27; August 3 and almost daily observations during much of the period. TOTAL: About 65 hours. CENSUS (* indicates a permanent resident): *Ruffed grouse, 1Y; whip-poor-will, 2P; ruby-throated hummingbird, 1P; flicker, 2Y; *pileated woodpecker, 1P; yellow-bellied sap-sucker, 1N, 2Y; *hairy woodpecker, 1NY, 1Y; *downy woodpecker, 2Y; crested flycatcher, 1P; phoebe, 1Y; wood pewee, 4Y, 1P; olive-sided flycatcher, 1Y; *blue jay, 1Y; *crow, 2Y; *black-capped chickadee, 1P, 4Y; *red-breasted nuthatch, 1Y; winter wren, 3P; catbird, 3Y; brown thrasher, 1P; robin, 3P, 7Y; wood thrush, 1NY; hermit thrush, 5P, 2Y; veery, 11P, 1Y; cedar waxwing, 4P; blue-headed vireo, 1P, 2Y; red-eyed vireo, 1P, 2Y; black and white warbler, 8Y; Nashville warbler, 1P, 1Y; magnolia warbler, 4Y; black-throated blue warbler, 6Y; myrtle warbler, 2Y; black-throated green warbler, 8Y; Blackburnian warbler, 5Y; chestnut-sided warbler, 1P, 7Y; oven-bird, 3P, 5Y; mourning warbler, 1P, 2Y; yellow-throat, 1P, 1Y; Canada warbler, 11P, 2Y; redstart, 1N, 5P, 1Y; Baltimore oriole, 1Y; cowbird, 1Y; scarlet tanager, 3Y; rose-breasted grosbeak, 2P, 1Y; purple finch, 2Y; goldfinch, 2P; slate-colored junco, 3P, 2Y; chipping sparrow, 4Y; white-throated sparrow, 9Y; song sparrow, 3Y. TOTAL: 49 species, 187 pairs. DENSITY: 374 pairs per 100 acres. COMMENT: This study area was severely damaged in the hurricane of September, 1938. Timber salvage covered most of the area during the following winter with brush left. During 1940 brush was cut and burned on a strip, 100 ft. wide, along one border and through the center. Natural reforestation has proceeded rapidly; the new deciduous growth is from 12 to 15 ft. in height and the older from 20 to 25 ft. Veeries, black-throated blue and Canada warblers show considerable increases while most of the other species have about the same breeding

populations, as in 1946. Perhaps the drop in Blackburnian warblers may be due to the lumbering operations of 1945. Except for one locality, only a few of the big hemlocks are now standing.—WENDELL P. SMITH, Wells River, Vt.

5. LONGLEAF-SLASH PINE, PALMETTO FLATWOODS. A typical flatwoods, the dominant species being longleaf pine *(Pinus palustris)*; secondary dominants, slash pine *(P. caribaea)*, turkey oak *(Quercus Catesbaei)*, and upland willow oak *(Q. cinerea)*, the latter two species being chiefly confined to about five acres of the southeastern corner that is relatively barren of trees. The forest is a mixed age stand, the older trees averaging 16 inches in diameter DBH and 90 ft. in height. All the older trees have been worked for "gum" and are in a decadent stage. About 1 dead tree or snag per acre. The area is completely covered by a substratum of shrubs averaging 4½ ft. in height, consisting chiefly of palmetto *(Sabal minor)*, gallberry *(Ilex glabra)*, blackberry *(Rubus* sp?), chinaquapin *(Castanea pumila)*, and live oak *(Quercus virginiana)*. The ground cover is comprised largely of blueberry *(Cyanococcus myrsinites)*, running-oak *(Quercus pumila)*, and wiregrass *(Aristida* sp?). (Botanical nomenclature above follows "Guide to Georgia Trees", by Wilbur H. Duncan, and "Manual of the Southeastern Flora", by J. K. Small, 1933 ed.). SIZE: 72 acres, (surveyed, 20 x 36 chains). LOCATION: North side of the road between Camp Cornelia and the boat landing, Okefenokee National Wildlife Refuge, Charlton County, Georgia. Tract bounded on three sides by similar forest, on the other by a narrow strip of palmetto with a few scattered pines. TOPOGRAPHY: Level with a "dreen" on the north side draining into the swamp. ELEVATION: 130-140 ft. SURVEYS: Selection and mapping completed April, 1947. COVERAGE: May 5, 9, 13, 14, 16, 20, 26, 27; June 4, 13, 17, 24; July 2. Hours varied from 5:30 a.m. to 9:00 p.m., totaled 25. WEATHER: Normal throughout period; previous winter open and unusually warm to March when low temperatures were recorded. Temperatures in 1947 breeding season about average but precipitation in April above normal; late spring. The birds were censused by the Williams spot-mapping method, and observations were made by traversing the area along staked lines 2 chains apart. CENSUS: Chuck-will's-widow, 1N; red-bellied woodpecker, 1N; red-headed woodpecker, 2N; crested flycatcher, 1N; brown-headed nuthatch, 1Y; Carolina wren, 1P; pine warbler, 1P; pine-woods sparrow, 1N, 2Y. TOTAL: 8 species, 11 pairs. DENSITY: 15 pairs per 100 acres. NESTING OUTSIDE BUT VISITING AREA FOR WATER AND FOOD: Flicker, 1N; red-bellied woodpecker, 1N; red-headed woodpecker, 1P; downy woodpecker, 1P; red-cockaded woodpecker, 1P; crested flycatcher, 1P; white-breasted nuthatch, 1P; Carolina wren, 2P; mockingbird, 1Y; brown thrasher, 1P; yellow-throat, 1P; pine warbler, 1P; cardinal, 1P; white-eyed towhee, 3P. TOTAL: 14 species, 17 pairs. DENSITY: 24 pairs per 100 acres. GRAND TOTAL: 17 species, 28 pairs. FINAL DENSITY: 39 pairs per 100 acres. FREQUENT VISITORS: Sparrow hawk; bob-white, wild turkey; nighthawk; chimney swift; kingbird; blue jay; fish crow; tufted titmouse; purple grackle.—RAYMOND J. FLEETWOOD, U.S. Fish and Wildlife Service, Folkston, Ga.

6. MATURE, UNDERSTOCKED LONGLEAF PINE AND PALMETTO FLATWOODS. A relatively mature, 10% stocked flatwoods with a fairly heavy growth of saw palmetto *(Sabal minor)* with the exception of one acre which is low and wet but supports a stand of slash pine *(Pinus caribaea)*. Other shrubs of the shrub stratum are: gallberry *(Ilex glabra)*; scrub oak *(Quercus myrtifolia)*; live oak *(Q. virginiana)*; blueberry *(Cyanococcus myrsinites)*, and stagger-bush *(Xolisma fruticosa)*. Trees average 90 ft. in height and about 16 inches DBH and practically all the larger ones have been worked for "gum." This practice and forest fires have killed many of the trees so there are almost as many dead trees and snags (5 per acre) as there are living trees. (Botanical nomenclature above follows "Guide to Georgia Trees," by Wilbur H. Duncan, and "Manual of the Southeastern Flora," by J. K. Small, 1933 ed.). SIZE: 58 acres (surveyed). LOCATION: Okefenokee National Wildlife Refuge, Charlton county, Georgia. Tract bounded on all sides by a similar forest with the exception of 6 chains on the south side which is slash pine and may constitute the edge. TOPOGRAPHY: Level, elevation 140-150 ft. SURVEYS: Area selected, marked and mapped in May, 1947. COVERAGE. May 13, 14, 19, 26; June 5, 12, 14, 17, 19, 25: Hours varied from 6:00 a.m. to 8:00 p.m., and totaled 20. The birds were censused by the Williams spot-mapping method; and observations were made by traversing the area along marked lines 2 chains apart. CENSUS: Red-headed woodpecker, 2N; hairy woodpecker, 1N; red-cockaded woodpecker, 1N; crested flycatcher, 1N; blue jay, 1N; brown-headed nuthatch, 1N; Carolina wren, 1P; mockingbird, 1P; brown thrasher, 1P; bluebird, 1P (2N); pine warbler, 1Y. TOTAL: 11 species, 12 pairs. DENSITY: 21 pairs per 100 acres. BIRDS NESTING OUTSIDE AND VISITING AREA FOR FOOD: Bob-white, 1P; nighthawk, 1P; flicker, 1P; red-bellied woodpecker, 1P; kingbird, 2P; mockingbird, 1P; yellow-throat, 1P; meadowlark, 1P; white-eyed towhee, 1P. TOTAL: 9 species, 10 pairs. DENSITY: 17 pairs per 100 acres. GRAND TOTAL: 19 species, 22 pairs. FINAL DENSITY: 38 pairs per 100 acres. INFREQUENT VISITORS: Sparrow hawk, mourning dove, downy woodpecker, wood pewee, purple martin, fish crow, purple grackle, cardinal and pine-woods sparrow. COMMENT: The pair of bluebirds nested in a box that I erected this spring. The red-headed woodpeckers occupied holes made by red-cockaded woodpeckers in live pine trees. —RAYMOND J. FLEETWOOD, U.S. Fish and Wildlife Service, Folkston, Georgia.

7. YOUNG SOUTHERN LOBLOLLY-SHORTLEAF PINE. Tract of 24 acres personally owned by the author located one-half mile southwest of the city limits of Athens, Georgia. The forest, dominated about equally by loblolly *(Pinus taeda)* and shortleaf pine *(Pinus echinata)*, is typical of that which develops on abandoned upland cotton and corn fields in the Piedmont Region of the

Southeast. The stand ranges from about 20 years old on west border to 45 years on east side, averaging about 35 years old. Large terraces remain from former cultivation; in general, they support a heavier undergrowth and more deciduous understory trees (tulip popular, dogwood, persimmon, sweet gum, water oak) than the interterrace areas which are covered with a more or less open stand of pine in which the deciduous understory is just beginning to develop. Broomsedge grass (*Andropogon* sp.), characteristic pioneer invader of old fields in this region, still persists in the younger west section but has been shaded out over most of the area. A small stream crosses the northern half of the area and is bordered by large tulip poplars and other deciduous trees, the only place on the area where broadleaf trees form an appreciable part of the overstory. The plant ecology of the pine succession has been well described by Oosting (*Amer. Mid. Nat.*, 28:1—126, 1942); the area resembles the 31-year pine stand described by Oosting (page 30) but is not as uniform in composition due to local effects of stream, terraces and a few badly-eroded spots. The area is bordered by similar pine forest except on the west where younger pines occur and on south where it merges into the river bottom forest of Oconee River. COVERAGE: 2-3 hour early morning visits on April 6, 13, 23, 30; May 21, 24; June 1, 7. Also about 8 one-hour late afternoon visits; total about 28 hours. CENSUS (Fractions indicate that some territories were partly on and partly off the area so that pair would be actually on the area part of time): Chuck-will's-widow, ¾P; Carolina chickadee, ½P; Carolina wren, 1Y; brown thrasher, 1P; white-eyed vireo, 1P; pine warbler, 3N, 5P; summer tanager 3P; Towhee, 2¼P; cardinal, 1Y, 1¼P; Bachman's sparrow, 1P; field sparrow, 2P. TOTAL: 11 species, 22¾ pairs. DENSITY: 95 pairs per 100 acres. VISITORS (Birds nesting outside area but entering it to feed, and singing males observed only once or twice): Bob-white, 1 P; broad-winged hawk, 1 ind.; crow, several; tufted titmouse, 1 P; wood thrush, 1 singing male; blue-gray gnatcatcher, 1 P; red-eyed vireo, 1 ind.; prairie warbler, 1 singing male; hooded warbler, 1 singing male; yellow-breasted chat, 1 singing male; blue grosbeak, 1 singing male; Acadian flycatcher, 1 ind. Total 12 species, 15+ individuals; average 3 visitors per morning census trip. COMMENTS. The field and Bachman's sparrows are relics of younger seral stage (as are such visitors as prairie warbler and chat). The wood thrush, hooded warbler, and Acadian flycatcher may be expected to nest when forest becomes older. Over 30% of breeding birds belong to one species, the pine warbler, which is almost the only species living entirely in pure stands of pine. The abundance of most other species depends on development of understory and presence of water. The area in question is about average in these respects for this forest type.—EUGENE P. ODUM, University of Georgia, Athens, Ga.

8. NORTHERN SCRUB OAK. A 36-acre tract burned during 1934, typical clay-colored sparrow nesting habitat of central Michigan, vegetation now growing up much more in height. Covered with scrub oak, small hawthorne, choke cherry, beaked hazel-nut, maple, shad bush and sweet fern and patches of blueberries. First described and censused in 1944. Located directly west of Lovells, Crawford County, Michigan. The area is ½ mile long and extends 100 yards on each side of the highway leading toward Grayling; R2W, T28N, S24. COVERAGE; June 17, 18, 19, 22; July 4, 5, 6, 8, 9; June 14 hours; July 19 hours. Total, 33 hours. CENSUS: Killdeer, 1P (by gravel pit); black-billed cuckoo, 2P (1Y, 1P); nighthawk, 1P; belted kingfisher 2N (in gravel pit bank); flicker, 1P; eastern kingbird, 4P (2N, 2P); least flycatcher, 2P; prairie horned lark, 1P; bank swallow, 1N; house wren 1P; brown thrasher, 2P (1Y, 1P); robin, 2P (1N 1Y); hermit thrush, 1P: bluebird, 1P; cedar waxwing 1P; starling, 1P; red-eyed vireo, 2P; pine warbler, 1P; prairie warbler, 3P; n. yellow-throat, 1P; e. meadowlark, 1P; cowbird, 2P; purple finch, 1N; goldfinch, 2P; chipping sparrow, 4P (3N); clay-colored sparrow, 7P (7N, 2Y); field sparrow, 3P (1N, 2P). TOTAL: 27 species, 51 pairs. DENSITY: 142 pairs per 100 acres (242 in 1944, 194 in 1945, 207 in 1946). BIRDS FEEDING ON AREA BUT NESTING ELSEWHERE: downy woodpecker, 1P; barn swallow, several; purple martin, several; crow, at least 3 individuals; black and white warbler, 1P. COMMENT: Disappearance of clay-colored sparrows and many other species is noted and the presence of others for the first time.—WILLIAM A. DYER, Union City, Mich., BERNARD W. BAKER, Marne, Mich., LAWRENCE H. WALKINSHAW, Battle Creek, Mich.

9. PARTIALLY CUT-OVER NORTHERN HARDWOOD SLOPE. An area of 23 acres located just south of New Hampton, New Hampshire; described and first censused in 1943. A small V section of hardwood was entirely cut out on upper eastern side late in summer. Young hemlocks now very little larger than last year, white pine seedlings vary from 12 to 45 inches in height. Blackberries and raspberries are being forced out of existence. Brush piles are starting to disintegrate amid a fern ground cover. Dead trees remain nearly the same in number but are very porous and not suitable for nesting. Road becoming nonexistent in upper part of area. COVERAGE: April 25, 30; May 8, 12, 15, 23, 24, 31; June 1, 9, 10, 12, 17, 21, 27; July 8, 14, 24; August 9, 12. Hours 7:30 a.m. to 12 noon. No night trips. Total hours, 30. WEATHER: Great excess of precipitation. Much sleet during winter months with hard crusts the rule. Spring arrival normal. July and August exceeded all records for heat during last 70 years, but in spite of this, precipitation was still above normal. CENSUS, PAIRS NESTING AND FEEDING IN AREA: Wood pewee, 1P; winter wren, 1Y, 2N; veery, 3P; red-eyed vireo, 1P; black and white warbler, 1Y; black-throated blue warbler, 3P; black-throated green warbler, 1P; chestnut-sided warbler, 5P, 2Y; oven-bird, AP; mourning warbler, 1P, 1Y; yellow-throat, 1P; Canada warbler, 2Y; redstart, 2P; scarlet tanager, 1P; indigo bunting, 1P; white-throated sparrow, 1Y (2N). TOTAL: 16 species, 30 pairs. DENSITY: 130 pairs per 100 acres. PAIRS NESTING WITHIN AREA BUT FEEDING

IN PART OUTSIDE: Flicker, 1N; hairy woodpecker, 1N; wood pewee, 3P; blue jay, 1Y; black-capped chickadee, 1Y; veery, 2P; red-eyed vireo, 4P; black and white warbler, 1Y; Nashville warbler, 2P; magnolia warbler, 1P; black-throated blue warbler, 2P; Blackburnian warbler, 1P; chestnut-sided warbler, 3P, 2Y; oven-bird, 2P; yellow-throat, 2Y; Canada warbler, 2P; indigo bunting, 1P; purple finch, 2P; chipping sparrow, 1Y; white-throated sparrow, 2Y; (2N). TOTAL: 20 species, 37 pairs. DENSITY: 161 pairs per 100 acres. GRAND TOTAL: 25 species, 67 pairs. FINAL DENSITY: 291 pairs per 100 acres (159 in 1943, 217 in 1944, 250 in 1945, 335 in 1946). FREQUENT VISITORS: Red-shouldered hawk (1P still nesting in same location near area), ruffed grouse, black-billed cuckoo, chimney swift, whip-poor-will, flicker, pileated woodpecker, yellow-bellied sapsucker, downy woodpecker, tree swallow, barn swallow, crow, white-breasted nuthatch, brown creeper, robin, hermit thrush, cedar waxwing, blue-headed vireo, Blackburnian warbler, rose-breasted grosbeak, goldfinch. COMMENT: Flicker came back to nest of several years duration but did not nest there. Rose-breasted grosbeak probably nested on area as it was seen 3 times. Sapsucker either nested or fed on area very often. Do not know whether veeries really decreased or not without a night visit.—VERA H. (MRS. CLINTON) WALLACE, New Hampton, N. H.

10. RECENTLY CUT-OVER EASTERN HARDWOOD SLOPE. A 15-acre portion of the valley of the Middle Fork of Little Beaver Creek, cut-over in 1940; located near Teegarden, Salem Township, Columbiana County, Ohio; described in 1943 and censused annually thereafter. The two species of *Rubus* are now being shaded out in parts of the area. COVERAGE: April 25, 27; May 21, 27; June 1, 3, 4, 6, 19, 22, 25, 29; July 4, 6, 16. Total, 25 hours. The usual checks for night species were also made. WEATHER: Through May and June rain fell on 29 different days yielding a total 5 inches above the 50-year average. Temperature through this period somewhat below normal, resulting in a retarded growth of vegetation. A heavy rain in early June flooded a few nests. CENSUS: Mourning dove, 1N; black-billed cuckoo, 1P; ruby-throated hummingbird, 1P; downy woodpecker, 1P; crested flycatcher, 1P; Acadian flycatcher, 2P; wood pewee, 2P; black-capped chickadee, 1P; tufted titmouse, 1P; wood thrush, 4P (3N, 1P); blue-gray gnatcatcher, 2P; cedar waxing, 1P; yellow-throated vireo, 1P; red-eyed vireo, 5P (1N, 4P); blue-winged warbler, 4P (1N, 3P); cerulean warbler, 3P; Kentucky warbler, 4P; yellow-breasted chat, 6P (1N, 5P); redstart, 1P; cowbird, 2P; scarlet tanager, 2P; cardinal, 4N; indigo bunting, 4P; goldfinch, 2P; red-eyed towhee, 3P; field sparrow, 1P; song sparrow, 1P. TOTAL: 27 species, 61 pairs. DENSITY: 407 pairs per 100 acres. VISITORS: Broad-winged hawk, June 14; yellow-billed cuckoo, May 21; flicker, 1P; pileated woodpecker, April 27; hairy woodpecker, 1P; Acadian flycatcher, 2P; white-breasted nuthatch, 1P; catbird, June 1; red-eyed vireo, 2P; Louisiana water-thrush, June 22; cardinal, 1P; rose-breasted grosbeak, May 21. COMMENT: The ruffed grouse was absent from the census area, but was found with young a short distance outside on June 22. The Carolina wren has not been restored since the severe winter of 1944-45.—PAUL A. STEWART, Leetonia, Ohio.

11. GRAZED AND UNGRAZED SUGAR MAPLE WOODLAND. A 12.4-acre grazed and an adjacent 7.9-acre ungrazed sugar maple woodland located in Burton Township, Geauga County, Ohio. Both areas are described in the 1939 breeding-bird census reports and, with the exception of 1943, have been censused annually since 1938. Approximately 15 large trees were removed from the ungrazed woods during the past winter, thus creating new openings. A rank growth of seedling maples is already present in these areas. No other change is evident from the 1946 conditions except the continual growth of seedling and sapling trees in the ungrazed woods and the further development of sod in the grazed area. COVERAGE: Observations were made in the early morning and evening hours of May 30, 31 and June 1. A total of 12 hours was devoted to bird census work. WEATHER: Weather conditions preceding and during the census were very unseasonable. Rainfall was unusually heavy and frequent and temperatures averaged well below normal. A light frost occurred on the morning of May 30. The temperature at 5:30 a.m. was 34°F. but rose to about 60° during the day. The early morning temperature of May 31 was 40° and that of June 1 near 60°. The first two days were clear; the last day was cloudy. CENSUS, UNGRAZED WOODS: Mourning dove, 1P; yellow-billed cuckoo, 1P; crested flycatcher, 1P; phoebe, 1P; wood pewee, 1P; catbird, 1P; blue jay, 1P; crow, 1P; white-breasted nuthatch 1P; red-eyed vireo, 3P; oven-bird, 1P; scarlet tanager, 1P; cowbird, 1P; cardinal, 1P; indigo bunting, 3P; towhee, 1P; field sparrow, 1P; song sparrow, 3P. TOTAL: 18 species, 25 pairs. DENSITY: 316 pairs per acre. CENSUS, GRAZED WOODS: Yellow-billed cuckoo, 1P; crow, 1P; red-eyed vireo, 3P; oven-bird, 1P; redstart, 1P; indigo bunting, 2P. TOTAL: 6 species, 9 pairs. DENSITY: 73 pairs per 100 acres. VISITORS, UNGRAZED WOODS: Baltimore oriole, 1M; bronzed grackle. VISITORS, GRAZED WOODS: Several bronzed grackles.—CHARLES A. DAMBACH, Dept. of Zoology and Entomology and Ohio Wildlife Research Unit, Ohio State University, Columbus, Ohio.

12. GRAZED MIXED OAK CLIMAX. Approximately 25 acres of mixed hardwood trees, the majority oaks, with little undergrowth, grazed heavily (about 85%) for at least 20 years. The larger trees, 50 to 70 ft. in height and with an average DBH of 11 inches, are composed of the following, in order of their abundance: white oak *(Quercus alba)*, red oak *(Q. rubra)*, black oak *(Q. velutina)*, flowering dogwood *(Cornus florida)*, chestnut oak *(Quercus prinus)*, tulip tree *(Liriodendron tulipifera)*, shagbark hickory *(Carya ovata* and *C. lacinosa)*, and red maple *(Acer rubrum)*. The shrubs, composed of sassafras *(Sassafras variifolium)*, and black haw *(Vibernum prunifolium)* are very few in number and coral berry *(Symphoricarpus orbicul-*

atus) summer grape *(Vitis* sp.) and pokeberry *(Phytolacca* sp.) form the sparse ground cover. The large number of chestnut stumps suggests that these trees at one time constituted a large part of the woods, but none of them are now standing. There are but 4 large dead trees of any kind left standing. Five years ago a forest fire touched on one corner and burned a very small portion (2%). (Botanical nomenclature follows Gray's "Manual".) SIZE: Roughly 25 acres. LOCATION: 1 mile west of Lexington, Virginia, at the base of the wooded ridge known as Brushy Hills—foothills of the Alleghany Mountains. TOPOGRAPHY: Steeply rolling crest of a large hill; a roughly hour-glass-shaped grove of trees surrounded on three sides by open farmland and adjutting from the main woods. EDGE: Practically no change of vegetation. COVERAGE: April 25, 30; May 9, 14, 20, 31; June 6, 21, 28; July 16, 17, 25; August 6. Total hours: 26. WEATHER: Normal except for abnormally cold July. CENSUS: Red-bellied woodpecker, 1P; downy woodpecker, 1P; crested flycatcher, 1P; wood pewee, 2P; crow, 4N, 2Y; tufted titmouse, 1P; Carolina chickadee, 1Y: Carolina wren, 1P; red-eyed vireo, 3P, 1Y; scarlet tanager, 1P; indigo bunting, 1P; cardinal, 1P. Total: 12 species, 21 pairs. DENSITY: 84 pairs per 100 acres. BIRDS FEEDING IN TRACT BUT NOT KNOWN TO BREED: Red-shouldered hawk (imm.), yellow-billed cuckoo, pileated woodpecker, hairy woodpecker, blue jay, blue-gray gnatcatcher, cedar waxwing, black and white warbler, oven-bird. The two warblers nested just outside the tract in ungrazed woods. COMMENT: The unusually low density is probably due to the fact that most of the low vegetation has been grazed away. The western end, which adjoins ungrazed woods, attracts most of the woodland birds, as scarlet tanager and red-eyed vireo, while the eastern end bordering on farmland, contains the crows' nests and birds such as indigo bunting and cardinal. The central section, connecting two pastures, is so heavily grazed that it is practically devoid of bird life.—BOBBY PAXTON, Lexington, Va.

13. DAMP DECIDUOUS SCRUB WITH NUMEROUS STANDING DEAD TREES. An area of 30 acres located on the U.S. Agricultural Research Center at Beltsville, on the coastal plain of Maryland. Originally forested by mixed pine-deciduous forest, this area was severely burned in the spring of 1942. All trees were killed, but many remain standing. Scrub and sapling growth has now reached a height of from 6 to 12 ft., and consists chiefly of the following species, arranged in order of decreasing abundance: sweet gum *(Liquidambar styraciflua)*, red maple *(Acer rubrum)*, black gum *(Nyssa sylvatica)*, dwarf sumac *(Rhus copallina)*, large-toothed aspen *(Populus grandidentata)*, willow oak *(Quercus phellos)*, white oak *(Q. alba)*, green brier *(Smilax rotundifolia)*, tulip tree *(Liriodendron tulipifera)*, pin oak *(Quercus palustris)*, and holly *(Ilex opaca)*. TOPOGRAPHY: Gently rolling; altitude 175 to 195 ft. Nearest water is a small stream 200 yards away. EDGE: None within 150 yards; the original forest, now principally oak, surrounds the 310-acre burned area. COVERAGE: April 14; May 14; June 24, 26, 27, 30; July 3, 4, 5, 6, 8, 10, 11, 15, 17, 30. Census trips were made between 4:40 a.m. and 9:10 a.m. except for trips which started about one hour before sunset on June 27, July 3, and July 4 and continued until dark. Total man-hours: 46 censusing, plus 15 looking for nests. Allen J. Duvall, Robert T. Mitchell and Lucas M. Dargan assisted by searching for nests. WEATHER: The early part of the winter was unusually warm and dry; February and March were also dry, but daily averages were 3° F. below normal. April temperatures were 4° above normal, but vegetation and bird migration progressed normally (in contrast to the premature springs of 1945 and 1946). Temperatures during the census period were near normal except during the last half of June when they ran from 2° to 6° below normal. Precipitation was light to moderate except during the first half of June when several thundershowers yielded over twice the normal rainfall. CENSUS: Yellow-throat, 24P (3Y, 15P, 6M); towhee, 17P (15P, 2M); prairie warbler, 15P (1N, 7Y, 3P, 4M); house wren, 15P (4N, 7P, 4M); yellow-breasted chat, 4.2P; field sparrow, 2P (1N, 1Y); bluebird, 2P (1N, 1Y); white-eyed vireo, 1.7Y; brown thrasher, 1.5P; wood pewee, 1.5P; woodcock, 1.5M; mourning dove, 1P; whip-poor-will, 1M; flicker, 1N; crested flycatcher, 1P; Carolina chickadee, 1P; hairy woodpecker, .8P; Carolina wren, .8P; indigo bunting, .8P; yellow-billed cuckoo, .5P; ruby-throated hummingbird, .5P; downy woodpecker, .5P; kingbird, .5P; tufted titmouse, .5P; catbird, .5P; red-eyed vireo, .5M; black and white warbler, .5M; pine warbler, .5M; cowbird, .5P; cardinal, .5P; goldfinch, .5P; Bachman's sparrow, .5M; turkey vulture, +P; red-tailed hawk, +P; sparrow hawk, +P; bob-white, +M; cedar waxwing, +P. TOTAL: 37 species, 99.3 pairs. DENSITY: 331 pairs per 100 acres. FREQUENT VISITORS: Chimney swift, phoebe, blue jay, crow, robin, scarlet tanager. COMMENT: (see Comment in following census). —ROBERT E. STEWART, MARTIN KARPLUS, CHANDLER S. ROBBINS, Patuxent Refuge, Laurel, Md.

14. DRY DECIDUOUS SCRUB. An area of 26 acres located on the U.S. Agricultural Research Center at Beltsville, on the coastal plain of Maryland, one-half mile northeast of the preceding study area, and located in the same 310-acre burn area. The original trees (pine and oak), which were killed by fire in the spring of 1942, have almost all fallen (in contrast to the preceding census area where many are still standing). Scrub and sapling growth has now reached a height of from 8 to 12 ft. Although bird distribution was quite uniform throughout the entire tract, two minor vegetative types could be detected, each occupying about half the total area. The higher land contained a dry type of scrub vegetation, with chestnut oak *(Quercus montanus)*, scarlet oak *(Q. coccinea)*, and dry-land blueberry *(Vaccinium vacillans)* the commonest woody plants; and white oak *(Quercus alba)*, northern red oak *(Q. borealis)*, black oak *(Q. velutina)*, sassafras *(Sassafras officinale)*, and chinquapin *(Castania pumila)* growing locally or in small numbers. The other type was slightly more mesophytic and was characterized by scrub white oak, black gum *(Nyssa sylvatica)*,

large-toothed aspen *(Populus grandidentata)*, and smooth sumac *(Rhus glabra)*, with dwarf sumac *(Rhus copallina)*, tulip tree *(Liriodendron tulipifera)* and mountain laurel *(Kalmia latifolia)* less common but widespread. TOPOGRAPHY: Gently rolling; altitude 190 to 210 ft. Nearest running water about ¼ mile away. EDGE: Bordered on one corner (275 ft.) by a 4-acre shrub swamp which contained no breeding species that were not found on the census area. Oak woods come within 50 ft. of the area at one corner but for hundreds of yards in all other directions, the tract is surrounded by more of the same deciduous scrub and sapling growth. COVERAGE: June 26, 27; July 3, 4, 5, 6, 8, 10, 11, 15, 17, 30. Census trips were made between 4:30 a.m. and 9:10 a.m. except for trips which started about one hour before sunset on June 27, July 3 and July 4 and continued until dark. Total man-hours: 36. WEATHER: (see preceding census). CENSUS: Prairie warbler, 22P (1N, 8Y, 5P, 8M); red-eyed towhee, 13P (1Y, 7P, 5M); yellow-throat, 12P (2Y, 2P, 8M); yellow-breasted chat, 4P (1Y, 1P, 2M); field sparrow 3P (1Y, 1P, 1M); goldfinch, 3P; white-eyed vireo, 1.5M; indigo bunting, 1.5M; brown thrasher, 1.3P (1Y, .3P); mourning dove, 1Y; whip-poor-will, 1P; ruby-throated hummingbird, 1P; flicker, 1Y; crested flycatcher, 1P; wood pewee, 1P; house wren, 1M; bluebird, 1Y; red-eyed vireo, 1P; bob-white, .8P; hairy woodpecker, .7P; cardinal, .7P; yellow-billed cuckoo, .5P; downy woodpecker, .5P; Carolina chickadee, .5P; tufted titmouse, .5P; cowbird, .5P; turkey vulture, +P; red-tailed hawk, +P. TOTAL: 28 species, 75.0 pairs. DENSITY: 288 pairs per 100 acres. FREQUENT VISITORS: Chimney swift, kingbird, phoebe, purple martin, blue jay, crow, catbird, robin, black and white warbler, hooded warbler. COMMENT: This and the preceding census are very similar in many respects. The present one differs from the other mainly in the lack of standing dead trees and consequent scarcity of house wrens (4 pairs per 100 acres instead of 47), and in the slightly drier ground which probably accounts for the smaller number of yellow-throats (46 pairs per 100 acres instead of 80), and larger number of prairie warblers (85 pairs per 100 acres instead of 50). The difference in total population is almost identical with the difference in house wren population. The preceding area contained all species of nesting birds found in this one, as well as 9 additional species; most of the latter, however, were present in very small numbers (½ pair or less), and all except three of them (sparrow hawk, woodcock, and pine warbler) occurred in this area as visitors.—CHANDLER S. ROBBINS, ROBERT E. STEWART, MARTIN KARPLUS, Patuxent Research Refuge, Laurel, Md.

15. MATURE STAND OF LIVE OAKS ALONG CANYON CREEK. An area of about 17 acres located in Mission Canyon, Santa Barbara, California, fully described in first census in 1944. COVERAGE: 24 trips between Jan. 27 and June 19, at all hours of the day, mostly in the morning, making a total of 37 hours. WEATHER: Normal temperatures for this region. Precipitation below normal again, although slightly higher than during winter of 1946. Mission creek practically dry during period of observation. Last rain occurred on March 28. Considerable fog during April and May. CENSUS: Black-chinned hummingbird, 3N; Anna's hummingbird, 1N; Allen's hummingbird, 6N; willow woodpecker, 1P; black phoebe, 1P; western flycatcher, 1Y, 1M; western wood pewee, 1N, 1M; olive-sided flycatcher, 1M; plain titmouse, 3N, 2Y; coast bush-tit, 2N; pallid wren-tit, 1N, 2P; house wren, 2N, 1M; Bewick's wren, 1P, 1M; canyon wren, 1M; russet-backed thrush, 1M; Hutton's vireo, 1N, 2Y, 1P; warbling vireo, 1N, 2M; orange-crowned warbler, 1N, 1P, 4M; yellow warbler, 1N, 1P; long-tailed chat, 1M; pileolated warbler, 2P, 1M; California purple finch, 2N, 1P; 1M; house finch 2N, 1Y; black-headed grosbeak, 1P, 1M; green-backed goldfinch, 4N, 1Y; spotted towhee, 1Y, 2P; California towhee, 2P; Oregon junco, 2N; song sparrow, 3N, 1Y. TOTAL: 29 species, 78 pairs. DENSITY: 459 pairs per hundred acres. COMMENT: The observers devoted only about half the time to the study of the area that they did in the three previous years. However, other causes doubtless contributed to the lowering of the density as reported. First, there was a complete defoliation of the live oaks, due to a severe attack of the oak moth. To this may be attributed the very noticeable absence of hummingbirds and bush-tits. Second, there was a thorough clean-up of the park, involving destruction of all the underbrush, thereby depriving ground and low-nesting birds of their nesting sites. Third, the continued drought through two winters, and the scarcity of water, may have resulted in discouraging bird nesting in this region.—ARTHUR E. and MAGDELEINE C. HUTCHINSON, 40 Glendessary Lane, Santa Barbara, Calif.

16. FOOTHILL CHAPARRAL. Approximately 50 acres of near-climax chaparral, predominantly black and white sage, scrub oak, laurel sumac, sugarbush, and mountain mahogany, with chamise dominant only on south-facing slopes, located ½ mile up the slope from the base of the San Gabriel Mountains along the Santa Anita Canyon Road north of Arcadia, California. Altitude 1150-1700 ft. Described in detail and first censused in 1946. No significant changes in the vegetation since last year. COVERAGE: March 16; April 5, 20, 26; May 3, 18; June 5. Hours usually in early a.m., but varying from 4:15 to 11:30, with one evening visit on May 3. Ralph Mall helped in the coverage during April. Total hours, 30. WEATHER: Total rainfall for the winter and spring (to June 30) was 22.93 inches, considerably better than last year but still below the normal of 28 inches. Its distribution (19.77 inches by Dec. 31) was such that the whole area was lush and green by January, but later flowering plants were brought to a slow maturity by cold weather in February and lack of further heavy rains. Subsurface moisture conditions at the end of June were the driest in many years. CENSUS: Red-tailed hawk, ⅛P; mourning dove, ½P; horned owl, ½P; poor-will, 2M; white-throated swift, equiv. 2P (4 indiv.); Costa's hummingbird, equiv. 7P (11F, 3+M); Anna's hummingbird, equiv. 1P (2U(?)M); red-shafted flicker, ⅛P; California woodpecker, 1/12P; Nuttall's woodpecker, ⅛P; ash-throated flycatcher,

1P; violet-green swallow, equiv. 1P (2 indiv.); California jay, 1Y; plain titmouse, ⅛P; bush-tit, 1N, 4Y; wren-tit, equiv. 31½P (1Y, 29P, 3UM); house wren, ⅛P; Bewick's wren, 3P, 2M; cañon wren, 1/12P; California thrasher, 4P; blue-gray gnatcatcher, ⅓P; phainopepla, 1P; Hutton's vireo, ¼P; lutescent orange-crowned warbler, 3P; black-headed grosbeak, ⅛P; purple finch, equiv. 2P (4 indiv.); green-backed goldfinch, equiv. 3P (6 indiv.); spotted towhee, 1Y, 7P, 3M; brown towhee, 8P, 1M; rufous-crowned sparrow, 1Y; black-chinned sparrow, 1M. TOTAL: 31 species, 94¼ pairs (or pair equivalents). DENSITY: 188.5 pairs per 100 acres.—HOWARD L. COGSWELL, 2610 S. Durfee Ave., El Monte, Cal.

17. OAK-SWEET GUM COMMUNITY. Forest crown mostly open with varied substratum; trees average about 50 ft. in height, vary from 40 to 75 ft., and average about 14 inches in diameter breast high; 60% oak (*Quercus* sp.), 30% sweet gum *(Liquidambar styraciflua)* and 10% others—red-bud *(Cercis canadensis)*, coral bean *(Erythrina arborea)*, mulberry *(Morus* sp.), haw *(Crataegus* sp.), etc. The trees support a moderate growth of epiphytes (bromeliads, orchids, ferns, etc.); about ten dead trees in fifteen acres; numerous well-rotted stumps indicate that the large trees were logged off a number of years ago. A fire swept through the northern half of the tract about 3 years ago destroying most of the underbrush and a few of the larger trees (substratum in this area now composed of grasses, weeds and saplings 3 to 6 ft. high). The western portion of the south half was largely cleared several years ago to make room for a gravel-loading station while the nearby highway was being paved (this area of about 2 acres is now prairie—short grass, scattered large trees and occasional clumps of weeds and shrubs). The southeastern portion and central strip has a dense substratum of saplings 6 to 20 ft. high and one to five inches in diameter (quadrats one yard to the side show four to eight trees, mostly one-half to two inches in diameter). Saplings here and there are cut frequently by natives who use the poles for construction purposes; the whole tract is now used for grazing cattle. SIZE: About 15 acres (220 by 330 paces). LOCATION: Long. 99° 22′ W., Lat., 22° 30′ N. in state of San Luis Potosi (Mexico) near Tamaulipas border. Tract bounded by oak forest except for short strip in southwest where it is near highway. TOPOGRAPHY: A tiny valley in mountain range; the north boundary of tract extends up mountain shoulder a few yards and is quite rocky; there are about 20 sink holes on tract; elevation, about 3450 ft. EDGE: Provided by prairie area and trail (about 400 yards); also a flight lane is provided by low substratum in northern portion of tract. SURVEYS: Visited once or twice per year for last five years; mapping completed June 6, 1947. COVERAGE: June 7, 8, 10, 11, 12, 13, 14, 16, 18, 19, July 11, 1947. Observers remained on tract 24 hours each day, but activity in field varied from 5:00 a.m. to 8:00 p.m. and totaled about 70 hours. WEATHER: Tract appeared somewhat drier the first part of June than it did previous year but after heavy rain the night of June 13 appeared as fresh as usual. Temperature at 6:00 a.m. around 65° F. and at 2:00 p.m. 90° F. Statistical data are not available but general appearance of trees suggests the available moisture corresponds to that of the hardwood forests of central east Texas. The tract is located in Hobart Smith's Austro-oriental (Lee R. Dice's Potosian) Biotic Province. CENSUS: White-fronted dove, 4P; blue ground dove, 2P; Mexican goshawk, 1N; ferruginous pygmy owl, 1P; owl sp., 1; Rivoli's hummingbird, 1P; curve-winged saberwing, 3P, 1N; Lichtenstein's woodpecker, 2P; ant-eating woodpecker, 1P; Swainson's woodhewer, 1P, 1Y; northern dendrocincla, 1P; Giraud's flycatcher, 1P, 1N; placid flycatcher, 1P; sulphur-bellied flycatcher, 1P; Swainson's flycatcher, 2P; Lawrence's flycatcher, 2P, 1N; Couch's kingbird, 1P; Mexican becard, 1N; green jay, 1P, 1Y; black-crested titmouse, 1P; speckle-breasted wren, 3P; black-headed nightingale thrush, 2P; blue mockingbird, 2P, 1Y; Sennett's thrasher, 1P, 2Y; Tamaulipas thrush, 7P; Jalapa thrush, 1P; brown-backed solitaire, 2P, 1Y; Orizaba vireo, 1P; yellow-green vireo, 6P; Mexican pepper-shrike, 1P, 1Y; rufous-capped warbler, 4P; Sennett's warbler, 1P; Brasher's warbler, 2P; Hartlaub's warbler, 1P; white-winged tanager, 1P; blue-hooded euphonia, 1N; red-eyed cowbird, 1P; Audubon's oriole, 1Y; hooded oriole, 1P; Texas sparrow, 7P, 4Y; rusty sparrow, 3P; rufous-capped sparrow, 4P; black-headed siskin 2P; Morellet's seedeater, 2P; Mexican grassquit, 3P, 1Y. TOTAL: 45 species, 104 pairs. DENSITY: 693 pairs per 100 acres. FREQUENT VISITORS: Red-billed pigeon, 1P; turkey vulture, 1P; yellow-cheeked parrot, 2P; blue-crowned motmot, 1P; Mexican trogon, 1P; coppery-tailed trogon, 1P; Central American squirrel cuckoo, 1P; Veracruz ivory-bill, 1P; Orizaba vireo, 1P; Lafresnaye's tanager, 1P; hepatic tanager, 1P; crimson-collared grosbeak, 1P; black-headed saltator, 1P. TOTAL: 13 species, 14 pairs; probable average density, 3 pairs. OCCASIONAL VISITORS: Mexican tinamou, 1P; northern crested guan, 1P; northern chacalaca, 2P; fawn-breasted hummingbird, 1; red-crowned parrot, 1P; white-billed pileated woodpecker, 1Y; Mexican tityra, 1P; banded cactus wren, 1P; Abbott's tanager, 1P; Abeille's grosbeak, 1P; Vigor's saltator, 1P. TOTAL: 11 species, 11 pairs; probable average density 1P. Flying over tract frequently but not observed in it: red-billed pigeon, 6P; black vulture, 3P; Ridgway's black hawk, 1P; Mexican green macaw, 20P; yellow-cheeked parrot, 8P; Richmond's swift, 3P; Mexican raven, 1P. TOTAL: 7 species, 42 pairs; average density, 0. TOTAL POPULATION: 108 pairs. TOTAL DENSITY: 720 pairs per 100 acres. The names used above were obtained from "The Birds of North and Middle America", (Bull. 50, U.S. Nat. Museum) except in a very few cases where the species are not included in the parts so far published. REMARKS: Since all 72 species of birds listed in or over the census tract had nesting territories in the vicinity, it is presumed that all occupy some place in its ecological picture at some time during the year and some species such as the swifts were in active competition with certain insect-eating birds resident in the tract at the time of the census. It is presumed that the macaws and more of the parrots would visit the tract when

the fruits of certain trees mature (the mountains above the valley are covered largely with oaks). The birds reported as resident in the tract (first section of census) are based on the average density to the best of the workers' ability. For example, there were three pairs of green jays in the tract a good part of the time but only the pair with young out of the nest remained in the tract at all times; hence, it was decided to list only one of the other two on the assumption that at least one of them was at all times in the tract and at least one of them would have nesting territory on the tract. Where such averaging could not be done the birds were listed under some other category, as Frequent Visitors, Occasional Visitors, etc., and averaged in with the whole group. Since the observers could not be present throughout the breeding season, it is not possible to say what percentage of the Frequent Visitors or Occasional Visitors nested on the tract this year. It is known that one Occasional Visitor nested on the tract and it is thought that others not listed as resident very likely did so. The white-billed pileated woodpeckers had left the nest before the census began and thereafter the family group ranged far and wide on the mountainside. They worked through the tract only twice during the time of the census. The last time they were seen the four birds were still traveling together. During the first part of May, 1946, a number of whip-poor-wills and two poor-wills were calling in the tract each night. Although these birds nest in regions both to the north and south of the tract, none were heard during the time of the census, and hence it is not known whether either occurs as a breeding species. In previous years the Mexican antshrike and the fan-tailed warbler were summer residents in the area but neither was listed during 1947. The antshrikes were present in 1946 but the fan-tailed warblers have not been listed since the underbrush fire. The Giraud flycatchers which were feeding young used the "flight lane" at the north side of the tract almost exclusively as a feeding ground. They ranged about 300 yards in an east-west direction and about 20 yards in a north-south direction. They were not observed to leave the tract. The other pair of this species engaged in some quarreling with the ones with the active nest, as their territories overlapped. The second pair, however, ranged down to the south side of the tract and flew out into the highway at times. The Couch's kingbirds had several regular perching trees in the "prairie area" of the tract. They remained on the tract most of the time but occasionally crossed the highway to perch. The goshawks were still in the tract July 11 but the adults were observed to fly across the highway for some distance at that time; during June they stayed rather close to the nest at all times as far as could be observed. The turkey vultures roosted in the tract at least part of the time, but probably had a nesting area just to the north as they frequently lit on the ground on the mountainside a few yards to the north of the boundary. The placid flycatchers were in almost the exact same territory in June, 1941, when they were observed feeding young. RELATIVE RELIABILITY: The identifications are based entirely on sight and since some birds were not seen clearly, all could not be identified with equal certainty. The most doubtful identification is the fawn-breasted hummingbird. It was seen only once (near the center of the tract in dense woods) and was gone so quickly that the only certain data obtained were that at least part of the bill was red and that part or all of the underparts were more or less buffy. The northern dendrocincla was the hardest to observe of any of the birds that were about the tract each day except the owls; the identification is based on relative size and general color. It was estimated that they were 1½ to 2 inches shorter than the Swainson's woodhewers. The only other probable species would be the Mexican sittasomus which is only 6 inches long. The difference in face and head markings could not be checked, but no streaking at all could be detected at a quick glance in the poorly-lighted places of observation. The "owl sp." hooted every night in the tract but was never seen although much time was spent in searching for it. It gave a series of six soft hoots, sometimes followed by a softer, shorter (or partial) seventh. It did not sound like the horned owl of Texas but since subspecies vary considerably in voice at times, it could have been a horned owl. The placid flycatcher could be observed carefully each day but the observers were not familiar with other species with which the bird might be confused and have not seen skins nor other examples of the species (these were small greenish-gray birds with yellow bellies, no wing bars, no eye ring, and show a yellow lining under the wing when it is raised; the call is a thin, plaintive "cheeee".) The Orizaba vireos look like warbling vireos with brown caps except for their underparts which are pale yellow. The yellow is much paler than that on the underparts of the yellow-green vireo. Careful bird study has likely not been done in this chain of mountains as several species listed in this census are mentioned in previously published papers as occurring no further north than central Veracruz. The census tract is less than 10 miles from the nearest point in Tamaulipas. The same chain of mountains continues in a northwest direction from the census tract into Tamaulipas; consequently, it would seem almost certain that all the species listed in this census should also occur in that state.—L. IRBY DAVIS and MARSHALL JOHNSTON, Harlingen, Tex.

18. VIRGIN SOUTHERN APPALACHIAN HEMLOCK FOREST. The study area (12 acres) is a remnant of the once extensive virgin hemlock forest known as "Primeval Forest" or "Ravenel's Woods" located 4 miles east of Highlands, North Carolina, and less than 10 miles from Georgia State line. The forest occupies an extensive and relative level, moist, plateau area at an altitude of approximately 4000 ft. It is (or was) the southernmost extensive stand of hemlock to be found in eastern United States (hemlock occurs south into Georgia but stands are small and usually limited to steep ravines). Although the owners of Primeval Forest originally intended that it be preserved, pressure of wartime high prices resulted in its sale. By summer of 1947 practically all of it had been logged. The small

tract of 12 acres which was censused is owned by Mr. Henry Wright of Highlands and will not be cut. Hemlock is the chief dominant, many trees being magnificent specimens, 4 and 5 ft. in diameter and 400 or more years old. Black birch *(Betula lenta)* is next most important tree, some reaching considerable size. Other deciduous trees (red oak, Frazier's magnolia, red maple) are widely scattered in the stand. The understory is a nearly continuous, and in some places almost impenetrable, mass of *Rhododendron* with some *Kalmia* and *Leucothoë;* in drier southeast corner *Polycodium* and *Vaccinium* replace *Rhododendron* as the understory. A detailed study of plant ecology of Primeval Forest was made by Oosting and Billings *(Amer. Mid. Nat.,* 22:333-350, 1939) prior to its destruction. The census area is bordered on the north by Highway 64, on west and south by recently logged hemlock, on east by second-growth forest and is bisected by a small stream. COVERAGE: Censused for two years as follows: in 1946, half-day (forenoon) visits June 18, 19, 20, 22, 27, 28; in 1947, half-day visits May 31, June 1, 11, 24. Also several shorter visits in June both years. Total about 35 hours each year. Fractions were used in census totals when territories were partly on and partly off area. CENSUS, 1946: Hairy woodpecker, 1½P; crested flycatcher, 1P; wood pewee, 1P; Carolina chickadee, 1Y; white-breasted nuthatch 1P; red-breasted nuthatch, 2P; brown creeper, 1N; catbird, 1N, 1P; wood thrush, 1P; mountain solitary vireo, 4P; black and white warbler, 1Y, 1P; parula warbler, 2P; Cairn's warbler, 1N, 8P; Blackburnian warbler, 6P; Canada warbler, 2Y, 3P; scarlet tanager, 3P. TOTAL: 16 species, 42½ pairs. DENSITY: 354 pairs per 100 acres. VISITORS: Tufted titmouse, rose-breasted grosbeak. CENSUS, 1947: Hairy woodpecker, 1P; wood pewee, ½P; Carolina chickadee, 1Y; tufted titmouse, ½P; white-breasted nuthatch, 1P; red-breasted nuthatch, 2¼P; brown creeper, 1P; catbird, 1Y, 1P; wood thrush, 1N, ½P; mountain solitary vireo, 2P; black and white warbler, 1Y, parula warbler, 2P; Cairn's warbler, 3N, 5P; Blackburnian warbler, 5P; Canada warbler, 3P; scarlet tanager, 1Y, 2½P; rose-breasted grosbeak, ½P. TOTAL: 17 species, 35¾ pairs. DENSITY: 298 pairs per 100 acres. VISITOR: Crested flycatcher. COMMENT: In addition to species listed above, the following were more or less regular visitors but apparently did not breed in area (in June at least): Pileated woodpecker, 1 ind.; blue jay, small groups; Carolina wren, 1 singing male; robin, several; oven-bird, 2 pairs; Carolina junco, 2 pairs. In 1947 a male Swainson's warbler was in full song along stream in the middle of the area on May 31 and June 1 but the species could not be found subsequently, and there was no definite evidence of breeding. In the cut-over hemlock adjoining the virgin forest there was a heavy concentration of "early seral" species such as chestnut-sided warbler, towhee, brown thrasher, and Carolina junco, individuals of which would occasionally penetrate a few yards into the virgin tract or use outlying trees as singing posts. Likewise, oven-birds were common in the second-growth forest and were occasionally seen in edge of the virgin tract; the oven-bird, and also for most part the wood thrush, seemed to avoid the rhododendron-hemlock climax combination. As result of two summers study of populations in the Highlands region, I am inclined to think that the high population reported above is typical of mesophytic forests of the region (both virgin and advanced second growth hemlock) and is not the result of the small size of the area censused. Judging from the study of other larger areas, I would estimate that 5% subtracted from the above total density would be a fair correction for the small size of the sample; this would still leave a high population as compared with most eastern climax forests. There can be no doubt that many of the moist climaxes of the southern Appalachians support a higher population than drier lowland climaxes of the southeastern region (compare Oak-Hickory which I censused at Athens, Ga.). The greater moisture content (hence more luxurious vegetation) is certainly a factor. Also, it will be noted that the three most abundant species are warblers, and that the five species of warblers breeding on the area make up over 50% of the total population. This is not the case in lowland climaxes since warblers constitute a much less important proportion of the total population. Maurice Brooks has suggested (in a paper given at 1946 A.O.U. meeting) that during glacial times the warblers and other northern breeders were driven and crowded into the unglaciated southern Appalachians where they were forced to seek out all possible niches. It is quite conceivable that such past events contribute both to the atypical habitat selection of some species and to the high populations present today. The total absence of the black-throated green warbler in the Highlands region, despite perfect habitat and the fact it breeds both to the south and north of area, is noteworthy. This and other problems will be discussed in more detail in a paper on bird populations of the Highlands Plateau now in preparation.—EUGENE P. ODUM, University of Georgia, Athens, Ga.

January 12th is your deadline for the 1947 Christmas Count

When mailing in your count please put your name and address on the envelope and also in the upper right-hand corner of the manuscript. The full list of names of participants or the name of the club should be included as usual in the closing lines of your report.

Date: December 20 through 28

See your November-December 1945 Audubon Magazine for regulations or your July 1947 issue of Audubon Field Notes

CLIMAX BEECH-MAPLE FOREST WITH SOME HEMLOCK (15 YEAR SUMMARY)

19. DESCRIPTION: The area in which this study has been made (see cover photograph) is approximately 65 acres in extent, located 16 miles east of Cleveland, Ohio, in the North Chagrin Reservation of the Cleveland Metropolitan Park System. It is heavily wooded with a mature forest in which beech and sugar maple dominate, and in which red maple, hemlock, tulip, cucumber, sour-gum and white ash appear regularly in much smaller numbers as associated species. There is included also a small area of elm, red maple and black ash, typical of the upland swamp forest of the region, but so far as the breeding birds are concerned this is apparently not a factor in their distribution. The northern fox grape is a characteristic plant of the area; in several places having created sizable tangles open to the sky.

This is a high, dark, humid, closed forest, except where the wild grape has created openings in the forest roof or windfalls have let in the sunshine. If any reader is interested in a more detailed description, he will find it in my previous article on this area. (Williams, 1936).

The study of the breeding bird population, of which this is a report, was undertaken first in 1932 as a part of a much larger project. During the succeeding 4 years the writer was fortunately so situated that he could and did visit the study area every Monday (with a few exceptions) throughout the four-year period, spending the entire day in the study of its plant and animal content. As may well be imagined, during that time he became so familiar with this particular forest community that he could easily think of himself as though he were part of it, and indeed, act as though he were. Since 1936 the study of the breeding bird population has been carried on regularly every year with the exception of 1942, thus making in all a 15-year study over a 16-year period.

METHODS: At the beginning of this study a method had to be invented for keeping track of the observations with reference to their distribution. In view of the fact that the method worked out in this early study with only slight modifications has become more or less the accepted method of most of our American breeding-bird census takers (Aldrich, 1947, p. 217), it seems worth while to describe it in some detail here.

First a scale map of the area was made which established definite boundaries, and included all stream beds, ravines, paths, trails and significant topographical features, thus making it easy to locate on such a map the approximate point at which any observation was made. This map was mimeographed, and a copy was always carried on any trip into the area. To simplify matters, each species of bird observed during the nesting season was given a code number. Thus with a little practice it became as natural and easy to refer to the white-breasted nuthatch by the figure "13" as by his full name. Fig. 1 shows one of these maps as it appeared after a day in the area.

For every trip taken a new map was used, on which was recorded as accurately as possible the location of every bird heard or seen, identified by its code number, indicating the sex when possible, marking the location of discovered nests with a circle, and accompanying the records with marginal notes when significant observations were made. This map, dated and headed with weather information, became the original record upon which future studies were based.

A separate map was then set up for each species of bird found in the area during the nesting season, and on it were accumulated all of the trip records made for that species. As the work progressed, and trip records were added to the species maps, it soon became apparent that these tended to accumulate about certain restricted smaller areas, which could be taken to represent the territories occupied by pairs of breeding birds of that species. As soon as the territory patterns began to appear on the species maps, an intensive search for nests or other data confirming the presence of a nesting pair of birds was made in the places indicated. Finally, at the end of the breeding season, all of the information gathered for each species was studied, and a judgment made as to the probable number and distribution of nesting pairs. Theoretical boundaries were drawn about the records which were thus judged to indicate nesting territories. Fig. 2 shows such a map, the species in this case being the hooded warbler.

Of course, in a forest such as the one under study, a great many nests were never discovered. In the subdued light, under heavy foliage, birds of the tree tops might be located only by the singing of the males, and probably more records have been made by ear than by sight. Yet it is the writer's opinion that the records made by the method described above are conservative and probably represent less than the actual breeding population present. Too many surprises in the form of overlooked nesting locations, which appear in the form of nests exposed after the leaves come off the trees, have turned up to make one believe that he

ever succeeds in locating them all. Even if all nests could be located, it is open to question if such a record alone would be an adequate basis for determining the breeding population. Probably the method above described is as reliable as any thus far devised (Kendeigh, 1944, pp. 90, 100).

As a test of the efficiency of the method, during one autumn and winter a determined effort was made to discover all of the nests of the wood thrush, red-eyed vireo and hooded warbler which had not been located during the summer. The nests of these three species are fairly conspicuous when the leaves come off the trees, and they do not disintegrate rapidly under normal weather conditions. An intensive search through the theoretical territory limits previously determined, netted enough additional nests to make up 90 per cent of the estimated total.

THE BIRD POPULATION: During the period of this study 33 species of birds have been found nesting in the area described. These may readily be separated into three groups—the summer residents; the permanent residents; and the occasionals. This is the arrangement in the table below, which gives the complete record of nesting pairs by years.

The group listed as "occasionals" really does not belong to the forest community. These are forest-edge birds whose activities are carried on mainly outside the limits of our area. Excluding these 6, we have 16 summer resident species and 11 permanent residents, which we may consider as making up the regular avian breeding community of the area. Taking the year 1947, which is a year of high numbers, estimating 3 pairs of cowbirds for the area, and including 1 pair of barred owls, which has been present

Nesting Pairs (In Order of Abundance)

	'32	'33	'34	'35	'36	'37	'38	'39	'40	'41	'42	'43	'44	'45	'46	'47	Ave.
Summer Resident Species																	
red-eyed vireo	25	36	35	30	24	20	21	21	18	21	x	20	20	23	33	34	25.4
oven-bird	11	18	16	8	14	22	14	19	17	25	x	18	25	22	14	25	17.9
wood thrush	17	25	22	14	8	6	14	11	12	11	x	6	12	18	18	20	14.3
hooded warbler	15	15	16	9	10	14	14	13	13	10	x	13	12	12	11	15	12.8
redstart	12	17	19	19	13	13	13	5	7	5	x	5	5	9	14	12	11.2
wood pewee	6	7	7	7	5	5	7	5	5	8	x	6	6	6	8	8	6.4
scarlet tanager	6	6	10	8	7	5	7	4	3	5	x	4	4	7	8	7	6.1
Acadian flycatcher	3	3	6	2	5	5	6	6	7	8	x	6	6	3	7	5	3.2
black thr. green warbler	3	3	5	3	4	3	2	4	—	1	x	3	3	3	4	3	2.9
Louisiana water-thrush	1	1	—	1	—	2	2	4	4	4	x	4	4	2	3	4	2.4
yellow-throated vireo	4	4	7	3	1	1	1	—	2	1	x	2	3	1	2	1	2.2
crested flycatcher	1	2	1	2	2	2	1	1	2	2	x	3	2	3	3	4	2.1
rose-breasted grosbeak	—	1	—	1	1	1	1	1	3	2	x	4	3	5	2	4	1.9
cerulean warbler	2	2	1	—	3	1	1	—	1	1	x	2	2	3	5	4	1.9
cowbird				always present								1	1	1	2	2	1.4
phoebe	1	2	—	1	—	1	1	2	1	1	x	1	1	2	2	2	1.2
Permanent Resident Species																	
tufted titmouse	7	8	6	7	3	5	5	7	6	3	x	6	9	6	6	3	5.8
cardinal	5	5	5	4	2	2	3	3	4	5	x	4	3	3	3	2	3.5
white-breasted nuthatch	3	3	4	4	3	3	3	3	3	3	x	3	4	3	4	3	3.3
downy woodpecker	1	4	5	2	2	2	3	3	5	4	x	4	4	3	4	3	3.3
black-capped chickadee	6	5	3	2	2	4	2	1	2	4	x	4	3	3	2	5	3.2
hairy woodpecker	1	3	3	3	2	3	2	2	3	3	x	3	3	2	2	1	2.4
barred owl	1	1	1	1	1	1	1	1	1	1	x	1	1	1	1	—	0.9
blue jay	—	—	—	—	—	—	1	1	—	2	x	1	1	3	—	1	0.7
red-bellied woodpecker	—	—	1	—	—	1	—	—	—	—	x	1	1	1	1	—	0.4
pileated woodpecker	1	—	—	—	—	—	—	—	—	—	x	1	—	1	1	1	0.3
ruffed grouse	1	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	0.1
Occasionals																	
towhee	3	1	2	1	1	—	1	1	—	—	x	1	—	—	—	—	0.7
robin	1	1	1	1	1	—	1	—	—	1	x	—	1	—	—	—	0.5
flicker	—	1	—	—	—	1	—	—	—	—	x	—	—	—	—	—	0.1
yellow-billed cuckoo	—	—	—	—	—	—	1	—	1	—	x	—	—	—	—	—	0.1
black-billed cuckoo	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	1	0.1
Carolina wren	—	—	—	—	—	—	1	—	—	—	x	—	—	—	—	—	0.1
Total pairs	136	174	176	133	114	123	129	118	120	131	x	125	139	146	160	170	139.6
Pairs per 100 acres	209	268	274	205	175	189	193	182	185	202	x	195	214	225	246	261	214.9

every year except 1947, it appears that 88.5% of the breeding bird population is made up of summer residents, and 11.5% of permanent resident species.

FLUCTUATIONS IN ABUNDANCE: During the period under study the most obvious thing about the record is the fluctuations in numbers which it shows. It will be noted from the table that density of population has varied from a total of 176 pairs in 1934 (274 per 100 acres) to 114 pairs in 1936 (175 per 100 acres), and that only a two-year period separates these two extremes. Since 1936 there has been a gradual, though irregular, building up of numbers, until in 1947 a more or less complete recovery seems to have been arrived at. We need to bear in mind, however, that these fluctuations only make a dent, as it were, in the total population, of which there is always a solid residuum.

If we chart the entire breeding population on the basis of nesting pairs per 100 acres, we find a pattern to which most of the species groups conform in some measure at least. The records of three of the most abundant species—the red-eyed vireo, wood thrush and redstart—conform closely to this pattern, and of course they have had a large part in producing it.

To determine whether these 3 species are more or less alone responsible for the condition shown, another curve was plotted for the remaining species on the basis of pairs per 100 acres, and it appears that the same general trend is shown in this group also. The same is true even for the permanent residents. A study of individual charts for each species reveals the influence of the steep reduction in numbers for the years 1935, 1936 and 1937. This is apparently not a matter of species fluctuation alone, but seems to indicate a response to some more general factor operating upon the entire avian community—possibly outside the area under study as well as inside it.

If we examine the weather records for North Chagrin, which were made with instruments on the spot for the years 1932 to 1935 inclusive, and which have been kept in a more general way by the writer for the years following, it appears that the breeding period has not experienced destructive storms or other forms of harmful disturbance since 1932 at least. However, the years 1932 to 1935 were marked by rather severe drought conditions. The year 1934 especially will be remembered as the year of the great drought throughout the country. Altogether these 4 years were very hard on forest vegetation at North Chagrin, and elsewhere, and were probably a contributing factor in the death of many large old beech trees in the area during succeeding years.

It seems to the writer quite within the range of possibility that such conditions might have been the cause of a greatly decreased insect population, upon which the summer resident birds almost entirely depend for food supplies, not only at North Chagrin, but elsewhere during their migratory journeys. Such depleted food supplies might well have reduced the ranks of this group, or so weakened many of them as to have caused a sharp drop in numbers such as was recorded in 1935-36.

Any shortage in basic food supplies would reduce the carrying capacity of the area and automatically result in a corresponding reduction in the numbers of its animal population. This was spectacularly demonstrated in the case of the small mammals in the area under study in 1933 and 1934 (Williams, 1936, p. 55). The failure of seed crops, such as beechnuts and sugar maple seeds, does not, of course, affect the summer resident bird population, but does mean something to the permanent residents which use vegetable as well as animal food.

It is now recognized generally that individual birds normally return season after season to the same nesting territories occupied by them in previous years. During the 16 years covered by this study, however, most, if not all, of the bird population of 1932 must have been replaced with new individuals, not only once, but possibly several times. The life span for small birds has been shown to be not more than a few years at best (Butts, 1931). The pair of barred owls in our area seems to have been the most stable of all the species present, yet the year 1947 finds them absent from their usual hunting and nesting grounds.

It has been noted that the nesting territories of some of the smaller birds tend to be practically identical for a few years, then change to a somewhat different pattern. This no doubt is due to the replacement of one or several individuals or pairs by others. The delay in recovery of numbers evident in our records may have been due to the lag in rapidity with which new and younger birds might be expected to find and occupy the territories made vacant by the dropping out of the older birds in such numbers as are recorded in 1935 and 1936.

Considerable mortality of both old and young birds during the nesting season is always noted, but this has probably been no greater than normal during the period of this study. To make up for such losses, many breeding birds will persist in their attempts to raise a brood of young, often making as many as three trials if the first are unsuccessful.

The usual predators in this area are the barred owl, pilot black snake, raccoon, skunk, opossum and red fox. The cowbird ought to be listed in this category also, since one or more

cowbird's eggs in the nest of a smaller bird usually means the destruction of the young of the host. None of these animals, however, were present in more than usual numbers in 1935 and 1936.

NESTING SITES: The ample carrying capacity of this forest is well indicated by the way its bird population takes advantage of every niche and level of the forest for nesting sites. Beginning in the deep ravines we find the Louisiana water-thrush placing her nest just above the stream edge and often far below the floor of the surrounding forest. The oven-bird, of course, is a typical forest-floor bird, her nest being tucked underneath the dry-leaf litter there. The rim of the hooded warbler's nest has been found within 18 inches of the ground in a plant of blue cohosh, but normally the hooded's nest is from 2 to 4 ft. off the ground, and usually, in this forest, in the crotch of a small seedling sugar maple. The wood thrush frequently builds as close to the ground as 4 ft., but may go much higher. One wood thrush nest in the area was about 40 ft. up, and others have been found higher than this. Chickadees may occupy holes in small dead stubs 3, 4 or 5 ft. from the ground. Each little glen usually has its pair of Acadian flycatchers nesting in the low-hanging limb of a beech, so that the nest is suspended above the ravine. The cardinal occupies the grape tangles, usually building her nest from 4 to 10 ft. above ground. The redstart's nest is apt to be in the fork of a small sapling 10 to 15 ft. up. Nuthatches, woodpeckers and titmice occupy nesting sites in holes anywhere from 10 to 50 ft. above ground. The black-throated green warblers hold to the hemlocks, where they nest fairly high up. The scarlet tanager and the wood pewee are nesters in the higher levels of the trees, and a nest of the cerulean warbler was found 100 ft. up in a great sugar maple, with only one layer of leaves between it and the blue sky. The most versatile nester of all is the red-eyed vireo, whose nest may be a few feet from the ground in a small sapling, or 70 ft. high in a massive beech tree. It has even been found nesting in hemlock, which is unusual. Thus, at times (such as 1934 and 1947) the habitat seems to have been fairly saturated from the standpoint of occupancy by its breeding bird population. Yet the carrying capacity of any habitat, for any group of birds, is determined, as noted previously, not only by number of available nesting sites, but also by the character and quantity of its food supply (Kendeigh, 1947, pp. 31, 94, 95).

VERTICAL TERRITORIES: It is also a characteristic of the distribution of these nesting sites that they frequently operate to establish territories limited vertically as well as horizontally, ranging as they do from the tops of tall trees down through the various forest levels to the bottoms of the ravines. Such a vertical division of territory may arise even between pairs of birds of the same species, as was the observed case with two pairs of red-eyed vireos. One pair had a nest approximately 70 ft. up in a large beech; the other had a nest in a small beech sapling almost directly below the first, about 6 ft. from the ground. One pair of birds had a tree-top territory, the other almost a ground-level territory.

INFLUENCE OF CHARACTER OF FOREST ON HEIGHT OF NESTS OF CERTAIN SPECIES: In a high, dark forest, such as that at North Chagrin, there is very little development of a shrub layer society. In general, the forest floor is bare except for a few places where secondary succession, due to windfalls, is in progress, or where small groups of seedling sugar maples occupy the ground. Under such conditions some birds usually considered as low-nesting species, seem to experience no difficulty with higher nesting sites. This is particularly true of the red-eyed vireo and the wood thrush. Pough, in his recently published *Audubon Bird Guide*, says of the red-eyed vireo: "prefers to nest within 5 feet of the ground, but will go up to 25 feet." Of the wood thrush he says: "seldom rises above the lower limbs of the trees even to sing," and nests "from 5 to 12 feet up." (Pough, 1946, pp. 115, 116, 143). Many other authors might be quoted substantially to the same effect.

But in the area under study the red-eyed vireo and the wood thrush, while often nesting within these low limits, are also quite at home at much higher levels. Many wood thrush nests in the area were between 25 and 40 ft. high, and the vireo, as noted above, might frequently become a tree-top bird, nesting as high as 70 ft. above ground.

SPECIES BEHAVIOR: In a bird population such as the one under study there is opportunity to contrast the behavior of species groups. One such contrast which has particularly interested the writer is that between the redstart and the hooded warbler groups. Both species arrive in the area at about the same time. The redstarts begin nest building immediately, get their eggs hatched and young out of the nest quickly, and leave the area as soon as the young are able to follow the parents. There seems to be a tenseness about their nesting activities, and a sense of urgency that is noticeable. In contrast to this the hooded warblers take about a week to get nest building under way, take time to construct a very well-made nest in quite leisurely fashion, take time also to build an additional nest or two if the first are not suc-

Figure 1

Breeding Bird Population Study—North Chagrin Reservation, Cleveland Metropolitan Park System. Census Map of Area for May 19, 1947. Study by A. B. Williams, Cleveland Museum.

cessful, and then linger about their territories through August and well into September.

Is it possible that we have here a key to the probable place of origin of these species? The redstart nests far to the north, where urgency in nesting activities may be a virtue because of the shortness of the season. The hooded warbler, however, at North Chagrin is near the northern limits of its breeding range. Its stronghold is in the south, where a longer breeding season may have developed the more leisurely type of nesting behavior. It seems reasonable to suppose that climatic conditions surrounding a species in its ancestral home should have left an imprint on the nesting behavior of the species which would persist even when the breeding period becomes identified with a different climatic environment.

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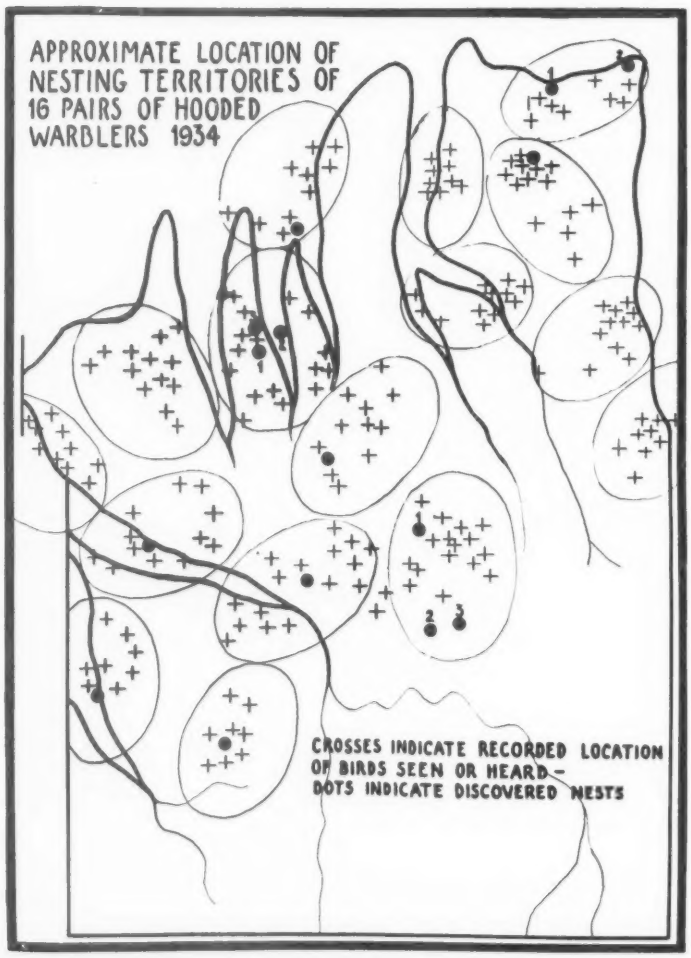

Figure 2

Breeding Bird Population Study. Approximate Nesting Territories of Sixteen Pairs of Hooded Warblers, North Chagrin Reservation, Cleveland Metropolitan Park System, Study by A. B. Williams, Cleveland Museum of Natural History.

20. DENSE LOWLAND BEECH-MAPLE FOREST. An area of 55.3 acres located 6 miles south of Youngstown, Ohio; fully described in 1940 and censused annually thereafter. The tract comprises the south-central portion of the Boardman Woods. COVERAGE: April 27, 29; May 10, 11, 22, 31; June 1, 3, 5, 7, 9, 12, 14, 15, 18, 22, 28, 29; July 4, 6, 10. Total 58 hours. Paul A. Stewart aided in the census on 2 trips and Elga Pollak on 14. WEATHER: The precipitation for April was almost double the normal amount, with temperatures near normal. In May the precipitation was not as great as May 1946; the ground was soggy due to the excess of rainfall stored up in the previous months. The temperatures for May were below normal, with snowfall on the 7th, 8th and 9th being the heaviest recorded here for this time of year. The first half of June was unusually wet, with the temperatures for the month slightly below normal. CENSUS: Red-shouldered hawk, 1N; mourning dove, 1P; pileated woodpecker, 1P; red-bellied woodpecker, 1P; hairy woodpecker, 2P; downy woodpecker, 2P; crested flycatcher, 2P; Acadian flycatcher, 4N, 7P; wood pewee, 13P; blue jay, 1P; black-capped chickadee, 1N; tufted titmouse, 3P; white-breasted nuthatch, 3P; wood thrush, 4N, 8P; yellow-throated vireo, 1P; red-eyed vireo, 1N, 13P; blue-winged warbler, 1P; cerulean warbler, 6P; oven-bird, 12P; Louisiana water-thrush, 2P; Kentucky warbler, 1P (rare locally but common a few miles south); redstart, 1N, 7P; cowbird, 4P; scarlet tanager, 1N, 6P; cardinal, 1N, 5P; red-eyed towhee, 2P. TOTAL: 26 species, 118 pairs. DENSITY: 213 pairs per 100 acres (222 in 1940, 203 in 1941, 215 in 1942, 237 in 1943, 246 in 1944, 255 in 1945, 213 in 1946). VISITORS: The wood duck, ruby-throated hummingbird and crow were visitors to the area, and may possibly have nested within it. The rose-breasted grosbeak, yellow-throat and goldfinch were casual visitors. Robins began visiting the area by June 28, and house wrens by July 4. A veery remained at least until June 12 and was believed to have been an unmated male.—E. O. MELLINGER, North Lima, Ohio.

21. RIDGE (OAK-HICKORY) AND SLOPE (BEECH-MAPLE) FOREST. An area of approximately 50 acres consisting of ridges and ravines with fairly steep slopes; located in Cuyahoga County, Ohio, in the northern portion of the Brecksville Reservation of the Cleveland Metropolitan Park System, 14 miles south of Cleveland's public square. On the ridges white, red, and black oaks and shag-bark hickory predominate; on the slopes beech, sugar maple, white ash, and other associated species occur. There is considerable undergrowth of seedling trees and shrubs, such as maple-leaved viburnum and red-berried elder. COVERAGE: April 22, 29; May 6, 13, 20, 27; June 3. Total, 35 hours. CENSUS: Hairy woodpecker, 1NY; Acadian flycatcher, 2P; wood pewee, 4P; black-capped chickadee, 2P, 1N; tufted titmouse, 6P; white-breasted nuthatch, 3P, 1NY; house wren, 1P; wood thrush, 6P; blue-gray gnatcatcher, 1NY; yellow-throated vireo, 3P; red-eyed vireo, 8P, 1NY; cerulean warbler, 14P; oven-bird, 8P; Louisiana water-thrush, 3P; hooded warbler, 6P; redstart, 17P; cowbird, present; scarlet tanager, 4P; cardinal, 3P; rose-breasted grosbeak, 1P; indigo bunting, 1P; towhee, 2P. TOTAL: 23 species, 100 pairs. DENSITY: 200 pairs per 100 acres. —HAROLD E. WALLIN, Cleveland Museum of Natural History, Cleveland, Ohio.

22. VIRGIN CENTRAL HARDWOOD DECIDUOUS FOREST. A magnificent stand of undisturbed deciduous forest, probably the finest that exists in Maryland today; located on the coastal plain on the fine sandy loam of the greensand district (Harper, Roland M. 1918—*A phytogeographical sketch of southern Maryland.* Journ. Wash. Acad. Sci., 8:581-589), one of the most fertile soils in the state. No living trees have been cut in this stand although occasional dead ones have been felled and used for lumber in the past. Dominant trees in the overstory range between 2 ft. and 4½ ft. DBH, and some of these probably reach a height of 130 ft. or more. Analysis of tree composition based on transect 4620 ft. long and 30 ft. wide (all trees over 6 inches in diameter, DBH, counted): tulip poplar *(Liriodendron tulipifera),* 38%; white oak *(Quercus alba),* 25%; pignut hickory *(Carya glabra),* 13%; black oak *(Quercus velutina),* 11%; northern red oak *(Q. borealis),* 6%; black gum *(Nyssa sylvatica),* 5%; miscellaneous deciduous species, 2%. Flowering dogwood *(Cornus florida)* is an abundant tree in the understory throughout the forest; spice bush *(Lindera benzoin)* is locally common. SIZE: 36 acres. LOCATION: On north side of Central Avenue, Prince Georges County, Maryland, 6 miles north of Upper Marlboro. TOPOGRAPHY: Rolling, elevation 140 to 180 ft. EDGE: About ¾ of the boundary is bordered by open agricultural land, and the rest by mature forest similar to that in the study area. COVERAGE: May 20, 21, 23, 28; June 5. Hours varied from 5:30 a.m. to 9:30 p.m. and totaled 28 (man-hours). CENSUS: Red-eyed vireo, 36P (35M, 1N); oven-bird, 19P (18M, 1Y); wood thrush, 14.5P (10.5, 4N); Acadian flycatcher, 12P (8M, 4P); scarlet tanager, 9.3P (5P, 4.3M); red-bellied woodpecker, 7P (5P, 2N); wood pewee, 7M; yelow-throated vireo, 7M; cardinal, 7P (4P, 3M); Kentucky warbler, 6P (5P, 1N); downy woodpecker, 5P (4P, 1N): black and white warbler, 4M; tufted titmouse, 3.5P (2Y, 1.5P); crested flycatcher, 3P; Carolina wren, 3P (2Y, 1P); hooded warbler, 3P; white-breasted nuthatch, 2P (1Y, 1P); ruby-throated hummingbird, 1.5 equiv. pairs (2F, 1M); parula warbler, 1.5M; yellow-billed cuckoo, 1P; hairy woodpecker, 1P; blue jay, 1P; Carolina chickadee, 1Y; worm-eating warbler, 1M; cowbird, 1 equiv. pair (2 indiv.); turkey vulture, +P; red-tailed hawk, +P; crow, +Y. TOTAL: 28 species, 157.3 pairs. DENSITY: 437 pairs per 100 acres. BIRDS USING MARGINS OF THE STUDY AREA AS PART OF THEIR TERRITORIES: Yellow-throat, 4P; indigo bunting, 4P; catbird, 3P; robin, 3P; white-eyed vireo, 3P; towhee, 3P; field sparrow, 3P; yellow-breasted chat, 1P; orchard oriole, 1P; blue grosbeak, 1P; and goldfinch, 1P. COMMENT: Although most of the study area was bordered by open fields no edge effect was noticeable as far as the forest species

were concerned (no differences in size or density of territories was noted between the center of the stand and the portions near the margin). The high density of birds found in this study area, believed to be the highest ever reported for a pure deciduous forest type without edge effect, is probably due to the fact that it is an unusually luxuriant virgin forest; this is partly a reflection of the high fertility of the soil on which it is growing. —ROBERT E. STEWART and CHANDLER S. ROBBINS, Patuxent Research Refuge, Laurel, Md.

23. MATURE DECIDUOUS FLOOD PLAIN FOREST. A mature woodland about 100 years old on Cabin John Island, a tract of flood plain in the gorge of the Potomac River, between the river on the southwest and the Chesapeake and Ohio Canal on the northeast. Trees of the overstory average between 80 and 100 ft. high and approximately 24 inches in DBH. The crowns are fairly well closed, but there are three or four openings of about one-tenth acre each. Overstory trees, in order of abundance, are: sycamore *(Platanus occidentalis)*, 50% (average DBH approximately 24″); American elm *(Ulmus americana)*, 20% (23″); black walnut *(Juglans nigra)*, 8% (22″); southern red oak *(Quercus rubra)*, 6% (25″); tulip tree *(Liriodendron tulipifera)*, 4% (30″); hackberry *(Celtis occidentalis)*, 3% (15″); white ash *(Fraxinus americana)*, 2% (18″); and honey locust *(Gleditsia triacanthos)* (20″); silver maple *(Acer saccharinum)* (16″), river birch *(Betula nigra)* (32″), basswood *(Tilia glabra)* (14″), bitternut hickory *(Hicoria cordiformis)* (14″); and willow oak *(Quercus phellos)* (20″) aggregating 7% (average DBH, 20″). Understory trees (12″ DBH or under) are as follows: American elm, 35% box elder *(Acer negundo)*, 30%; butternut *(Juglans cinerea)*, 8%; hackberry, 5%; white ash, 4%; blue beech *(Carpinus caroliniana)*, 4%; and others, mostly overstory species, 14.% Undergrowth, generally dense, except on one-half acre at the western extremity, where there is none, consists of papaw *(Asimina triloba)*, 10-12 feet tall, 45%; spice bush *(Benzoin aestivale)*, 6-8′, 30%; box elder, 8-12′, 20%; Japanese honeysuckle *(Lonicera japonica)*, 2%; and others 3%. Large vines of wild grape *(vitis* sp.) and trumpet creeper *(Tecoma radicans)* are numerous and may reach the tree-tops. Poison ivy *(Rhus toxicodendron)* is common near the water. (Tree nomenclature from Sudworth's "Check List of Forest Trees of the United States," 1927; other plants from Gray's "Manual of Botany, 1908. Percentages based on 15% estimate—DMT. July 26, 1947.) Herbaceous ground-corn is dense throughout the island and is generally waist-high. The sycamores, many of which have diameters of 4 feet or more, contain many natural cavities suited to the needs of the twelve hole-nesting species believed nesting on the tract. Because these cavities are so numerous, the abundant starlings, as they feed almost entirely outside the tract, probably have less effect on the numbers of nesting native birds than they do in many other situations. This tract, now included in the C. and O. Canal Unit of the National Capital Parks, was the site of 6 or 8 summer cottages, of which only the ruins of stone fireplaces remain. This former occupancy probably has not affected the ecology of the area for several years, except perhaps through the introduction of the small amount of Japanese honeysuckle present. No appreciable effect of the honeysuckle on the bird population was noted. Fishermen frequent one spot at the middle of the river side of the island, and a path to it, but have little or no effect on the bird life. Although the island is subject to occasional flooding, it has not been flooded during the last two years (except the two channels mentioned below). SIZE: 18.75 acres. The island is 400 to 600 ft. wide and 1800 ft. long, nearly 600 ft. wide at the north end and tapering to a point at the south end. Perimeter, approximately 4300 ft. LOCATION: Glen Echo, Montgomery County, Maryland, 2½ miles northwest of the District of Columbia line. Bounded in the south and southwest by a 30 to 60 foot-wide channel of the Potomac River, which is between this island and the north end of the similarly-wooded Chautauqua Island (500 ft.) and a chain of narrow (20-60 ft.) islands, often submerged (1250 ft.), beyond which is the main channel of the river, about 700 ft. across; on the northwest by Cabin John Creek (50 ft. wide), and similar Cedar Island (400 ft.); on the north and northeast by a narrower (25-35 ft.) channel, normally partly dry, beyond which is the Glen Echo picnic ground (not heavily used) at the north (250 ft.), and a strip of similar forest averaging 100 ft. wide lying between this channel and the C. and O. canal and Towpath (1900 ft.). TOPOGRAPHY: Nearly flat, except an old, dry channel 15-20 ft. wide and 450 ft. long across the south end, another, 300 ft. long, across the west corner, and an interior, undrained depression 5-10 ft. wide and 300 ft. long near the north end, containing some water throughout the year. ELEVATION: 50 to 55 ft. above sea level, and averages about 8 or 10 ft. above the usual level of the river. EDGE: 2150 ft. bounded by running water, 1750 ft. by still water and 400 ft. by dry or swampy channel. Only the 1250 ft. on the river side of the island need be considered true edge, as on other sides the vegetation across the channels is similar and the crowns of the trees generaly are closed over the water. SURVEY: Mapped with compass and tape, March 23 and 29, 1947. COVERAGE: Complete: April 26, 27; May 11, 15, 16, 17, 24, 30, 31 (a.m. and p.m.), June 7, 15, 21, 27, 29 (a.m. and p.m.); July 6, 10, 14, 20, 26. Part: April 20, June 28. Hours, between 4:30 a.m. and 7 p.m., total 75 (Observer hours, about 110). WEATHER: Generally unusual, especially the preceding winter. November, December and January averaged 7.1° F. above normal, while February and March were 3.0° F. normal. April was warm (4.1° above normal) while May and June averaged only 1.1° above normal. Daily extremes, however, were abnormal during April and May with many cool nights, and frosts May 9 and 10. Precipitation during November through March totaled 57% of normal, was nearly normal in April and May, and was 40% in excess of normal in June. (U.S. Weather Bureau data, Washington, D.C.). Plant growth activity was one or two weeks later than

usual. CENSUS: Yellow-billed cuckoo, 1P; barred owl, 1P; ruby-throated hummingbird, 1F; flicker, 2P; pileated woodpecker, 1P; red-bellied woodpecker, 2Y, 1P (3); downy woodpecker, 1Y, 1P (2); crested flycatcher, 2P; Acadian flycatcher, 2P, 5M (7); wood pewee, 1P, 3M (4); Carolina chickadee, 1Y + 3Y approx. ⅓ off area (3); tufted titmouse, 2Y, 1 2/2P, 1M (5); white-breasted nuthatch, 2P; Carolina wren, 2Y, 1M (3); wood thrush, 1Y, 2M (3); blue-gray gnatcatcher, 1P; yellow-throated vireo, 1P, 1M (2); red-eyed vireo, 2N, 3P, 6 2/2M (12); parula warbler, 2P, 9 2/2M (12); Louisiana waterthrush, 1Y; Kentucky warbler 4Y, 1P, 1M (6); yellow-throat, 2P; hooded warbler, 2P (females carrying food); redstart 7P, 3 2/2M (11); cowbird, 1P; scarlet tanager, 2M; cardinal, 1N, 2Y, 2M (5). TOTAL: 27 species, 97 pairs. DENSITY: 517 pairs per 100 acres. FEEDING OUTSIDE AREA: Wood duck, 1N; crow, 2N; starling, 13N, 1Y (14) (probably fed almost entirely in nearby residential area beyond canal. None recorded on census area after June 28, when only one family was noted.) FINAL TOTAL: 30 species, 114 pairs. FINAL DENSITY: 608 pairs per 100 acres. FREQUENT VISITORS: Great blue heron, 1P; black-crowned night heron, 1P and immature; wood duck, 1P; woodcock, 1 seen feeding March 25 (D.M.T.); spotted sandpiper, 1-2P; belted kingfisher, 1P; hairy woodpecker, 1P; downy woodpecker, 1P (nest just across channel in picnic ground); phoebe, 1P; wood pewee, 1P; blue jay, 1-2P; white-breasted nuthatch, 1P; catbird, 1P; robin, 1P; blue-gray gnatcatcher, 1P; cedar waxwing, 1P; red-eyed vireo, 3P; black and white warbler, 1P; prothonotary warbler, 2P (1Y); worm-eating warbler, 1M (July 6 and 26); parula warbler, 2-3P, oven-bird 1M; Louisiana water-thrush, 1-2P; yellow-throat, 2P; yellow-breasted chat, 1P; redstart, 2-3P; Baltimore oriole, 1M; purple grackle, several P; scarlet tanager, 1P; cardinal, 1P; indigo bunting, 2P; goldfinch, 2-3P; song sparrow, 2P (1Y) (both apparently nesting on narrow islands to southwest). FREQUENTLY OVERHEAD: Turkey vulture, chimney swift, rough-winged swallow. COMMENT: This census was initiated this year by the Audubon Society of the District of Columbia, partly because the nearby Glen Echo area (census no. 35) started in 1946, with its excessive amount of edge, was believed to have an unnaturally high concentration of breeding birds. Cabin John Island, however, had a population in 1947 equal to that on the less compact area (608 pairs compared with 609). Elimination of all pairs the centers of whose territories are believed to be within 100 ft. of the boundaries of the island indicates a density of approximately 602 pairs per 100 acres for the remaining 9.8 acres of interior. Species apparently definitely influenced by the edge are the wood duck, hummingbird, Louisiana water-thrush, and yellow-throat. Approximately two-thirds of the starlings, Acadian flycatchers, and Carolina chickadees were near the edges, while all other species were fairly evenly distributed throughout the island. The major edge-effect probably is the attraction of the large number of visitors, many of which, as the herons, sandpiper, and kingfisher require water for feeding, while others, as the robin, catbird and Baltimore oriole, appear to nest in or near the residential area above the river gorge and to feed in the bottomland. In addition to the predatory birds listed above, other predators noted during the census were one red squirrel and at least two gray squirrels. Dogs occasionally run on the tract, but are mostly kept out of the canal. Other mammals noted were a woodchuck, a muskrat and several cottontail rabbits and unidentified bats.—ERNEST BALDWIN, ELEANOR COOLEY, E. G. DAVIS, HELEN JOHNSTON, GERALD MERSEREAU, JOSEPH MERSEREAU, CHANDLER S. ROBBINS, NAPIER SHELTON, E. JEANNE STIVERS, JOHN W. TAYLOR, JR., DONALD M. THATCHER—Audubon Society of the District of Columbia.

24. CLIMAX SOUTHERN OAK-HICKORY FOREST. Twenty-acre tract located in a ravine on University of Georgia property on the Whitehall road near Athens, Georgia. Mature forest with principal dominants being several species of oaks *(Quercus alba, borealis, stellata, velutina)*, and hickories, with tulip poplar *(Liriodendron)*, red maple, gums, and some beech occurring regularly. The understory is well developed and consists of seedlings of the dominants, dogwood, redbud and many other small trees and shrubs. For a more complete description of climatic climax community of Piedmont region see Oosting, *Amer. Mid. Nat.*, 28;1-126, 1942, p. 89. The area is the best example of climax forest in the Athens area, being little disturbed for many years except for removal of scattered relict pines. The area is elongate, averaging 600 ft. in width, with a small stream running down the middle. The land is steeply sloping on one side, gently sloping on the other. The twenty acres to be censused were laid out so that a buffer strip of similar forest remained all around the periphery. However, it must be remembered that large areas of climax forests free from influence of adjacent younger growth or forest edge do not exist in agricultural regions, undisturbed areas usually being small in extent and located on terrain less suitable for farming. COVERAGE: April 20, 22; May 4, 9, 16, 26; June 8 (all 3-4 hour early morning visits); also one late afternoon visit. Total about 26 hours. CENSUS (Fractions are used where territories were partly on and partly off the area): Yellow-billed cuckoo, 2½ P; chuck-will's-widow, ½ P; ruby-throated hummingbird, 1 N, 1 female; hairy woodpecker, 1 P; downy woodpecker, 1 P; crested flycatcher, 2½ P; Acadian flycatcher, 1P; wood pewee, 1 P; Carolina chickadee, ½ P; tufted titmouse, 1 N, 2 P; Carolina wren, 1 Y, 1½ P; wood thrush, 3 N, 3 P; blue-gray gnatcatcher, 1 N, 1½ P; red-eyed vireo, 8 P; yellow-throated vireo, 1¾ P; black and white warbler, 1Y, 1P; hooded warbler, 2½ P; Kentucky warbler, 1 P; Louisiana water-thrush, 1P; summer tanager, 3 P; cardinal, 1 Y, 3½ P. TOTAL: 21 species, 49¾ pairs. DENSITY: 249 pairs per 100 acres. VISITORS: The blue jay and broad-winged hawk were the only additional permanent or summer resident species recorded on the area, but a number of individuals of species listed above were recorded

only once and were judged visitors (not recorded in above total). In early May very large numbers of transient warblers, vireos, thrushes, and scarlet tanagers were on the area. COMMENT: It is interesting to compare the present census of a deciduous forest climax in the South with censuses of northern climax deciduous forests as recently summarized by Kendeigh *(Ecol Monog.,* 14:67-106, 1944). Both the total density and species composition are quite similar, the chief difference apparently being that breeding warblers are less numerous in southern deciduous forests. Kendeigh lists the four most abundant species in northern forests as: oven-bird, red-eyed vireo, redstart, and wood thrush. Of these the red-eyed vireo and wood thrush are the most abundant birds in above census area while oven-bird and redstart are absent entirely as breeding birds in the region. Just a few miles northward in Georgia both species are common and there is some evidence that the oven-bird is invading southward.—EUGENE P. ODUM, University of Georgia, Athens, Ga.

25. SOUTHERN SECOND GROWTH OAK-GUM FOREST. SIZE: 30.4 acres, shaped about like a parallelogram 1300 x 900 ft., determined by compass and pace method. DESCRIPTION: Uniform contiguous woodland with no clearings. Crown consists of mature trees, 40-70 ft. high, separated thus: sweet gum *(Liquidambar styraciflua)* 40%; southern red oak *(Quercus falcata)* 36%; misc. oaks (blackjack, water, black, willow, scarlet and white) 9%; black cherry *(Prunus serotina),* 7%; black gum *(Nyssa sylvatica),* 5%; hickory *(Hickoria* sp.*),* 2%; pine *(Pinus taeda & P. virginiana),* 1%. The understory is dogwood *(Cornus* sp.*),* 80%; sapling oak, gum and hickory, 12%; mulberry *(Morus* sp.*),* 5%; and hawthorn *(Crataegus* sp.*),* 3%. The floor is thickly covered with a variety of shrubs of which honeysuckle *(Lonicera* sp.*)* and poison ivy *(Toxicodendron radicans)* together comprise 50%. TOPOGRAPHY: Elevation 500 ft. gentle slope, less than 1% rising from Village Creek, 300 yards to the north to a small chert ridge (Enon Ridge) 50 yards south, with 2 shallow gullies containing water only in wet weather. EDGE: None. Woodland continues for at least 10 yards on all sides, with two small cotton fields 15 to 20 yards from the northwest and northeast corners, respectively. LOCATION: North and west of the campus of Birmingham-Southern College within the city limits of Birmingham, Alabama. Nearest buildings are private homes 600 yards to the east and a college dormitory 200 yards to the south. This area is typical of Alabama deciduous woodland north of the piedmont. COVERAGE: 19 trips as follows: Jan. 4; Mar. 15, 22, 29; Apr. 7, 16, 19, 30; May 3, 8 (night), 10, 16, 23, 24, 30, 31; June 14; July 5, 26; total hours, 55. The season in Alabama is approximately one month ahead of New York and Ohio, hence heavy coverage in May. WEATHER: The winter of 1946-47 was unusually mild until mid-February. Then there was one month of cold weather (min. 17° F.) with several snow flurries. The spring was cold and wet through mid-May with most bird arrivals 7 to 10 days late. From mid-May on, the weather was normal except for a cold spell in late June (min. 56°) and a hot dry spell in late July (max. 103°). CENSUS: Red-shouldered hawk, +NY; mourning dove, .2+Y (.2Y+Y); yellow-billed cuckoo, 1P; flicker, .4N, .4Y; red-headed woodpecker, .1P; hairy woodpecker, .6P; downy woodpecker, 3P; wood pewee, .8P; crested flycatcher, .6P; blue jay, 1+N (1N, +N), 1Y, 1P; Carolina chickadee, 1Y; tufted titmouse 1.9Y (1Y, .9Y); Carolina wren, 1Y; wood thrush, 3Y, 1P; white-eyed vireo, 2Y, 1P; Kentucky warbler, 2Y, 1.7P (1P, .7P); summer tanager, .5P; cowbird, 1Y; cardinal, 4Y; red-eyed towhee, 6Y. TOTAL: 22 species, 35.5 pairs. DENSITY: 117 pairs per 100 acres. COMMENT: The following territories in acres were determined for species that included more than one pair in the area; towhee, max. 2.7, min. 1.6, av. 2.0; wood thrush, max. 3.7, min. 2.8, av. 3.4; white-eyed vireo, max. 4.5, min. 2.9, av. 3.7; red-eyed vireo, max. 4.9, min. 3.2, av. 4.1; cardinal, max. 5.0, min. 3.7, av. 4.5; Kentucky warbler, max. 6.0, min. 4.5, av. 5.2; yellow-throated vireo, max. 6.5, min. 6.1, av. 6.3. No special effort was made to locate nests after other positive breeding evidence was found. A pair of chuck-will's-widows might have been missed as they have bred in the area in the past. A second night trip should have been made.—THOMAS A. IMHOF, Fairfield, Ala., and MORTON H. PERRY, Birmingham, Ala.

26. BRUSHY FIELD, WOODLOTS AND POND. The same 100-acre farm censused now for 10 years. The area has not been farmed for many years and consists of open fields, woodlots and pond. The open fields (83 acres) are covered sparingly with trees and shrubs: New Jersey tea *(Ceanothus americanus),* dwarf sumac *(Rhus copallina),* staghorn sumac *(R. typhina),* blackberry *(Rubus* sp.*),* black raspberry *(Rubus* sp.*),* hawthorn *(Crataegus* sp.*),* grape *(Vitis* sp.*),* white oak *(Quercus alba),* red oak *(Q. rubra),* black oak *(Q. velutina),* hickory *(Carya* sp.*),* black cherry *(Prunus serotina),* maple *(Acer* sp.*),* box elder *(Acer negundo),* and aspen *(Populus* sp.*).* Many different grasses are present including *Leptolma cognata* on many of the hills, as well as mosses, etc. Four small houses were occupied during the entire 10 years. The pond (5 acres) was dry during 1938, when first examined July 10; during 1939 water remained until September 10; and during 1940, until July 1; during 1941, dry during entire summer; 1942, water over entire pond all summer; 1943, exceedingly great amount of water extending back into small shrub-covered swale to south of area; 1944, a great deal of water but due to summer drought, contained much less by fall; 1945, less water but some present all summer; 1946, dry by July 1; 1947, water during entire year increasing with heavier April rains and again during late August. Bushes bordering the pond included the following species; dogwood *(Cornus stolonifera* and *C. amomum),* willow *(Salix* sp.*),* elderberry *(Sambucus canadensis),* buttonbush *(Cephalanthus accidentalis),* spiraea *(Spirea latifolia* and *S. tom-*

entosa). Marsh grass and sedges have varied in density during the 10 years. Two small partially cut-over woodlots (total, 12 acres), one in the northeast corner of the 100 acres, the other in the southeast corner, consisted mainly of black and red oak and some hickory with the following small bushes beneath: New Jersey tea, hazelnut *(Corylus americana),* blackberry, elderberry, dogwood, small oaks and hickories, etc. Some of the oaks are nearly dead and many old stubs remain standing. LOCATION: In Pennfield Township Calhoun County, Michigan (2 miles from the heart of Battle Creek, immediately opposite North Ave.). TOPOGRAPHY: Open fields nearly level on west half; sloping into rolling, badly eroded hills in east half, all covered sparingly with trees and shrubs. Woodlands both located on rolling country. Bounded on the east by farmland; on the north and south by open unfarmed fields; on the west by Orchard Park subdivision and a heavily traveled concrete highway. COVERAGE: (1947) April, 3 hours; May, 6 hours; June, 4 hours; July, 23 hours; August, 3 hours. Total (to September 6), 39 hours. WEATHER: (1947) Colder than normal with much rain during April, May and June. July a little colder than normal with litte rain; August the hottest on record in southern Michigan with no rain until the 19th. CENSUS (Pairs):

Fields (83 acres)	'38	'39	'40	'41	'42	'43	'44	'45	'46	'47	Ave.
bob-white	4	4	6	2	3	4	3	2	2	1P	3.1
ring-necked pheasant	1	1	1	—	1	1	—	—	—	—	0.5
mourning dove	—	—	—	2	2	2	2	2	2	2P	1.4
yellow-billed cuckoo	—	—	—	—	1	1	2	—	2	2P	0.8
black-billed cuckoo	2	2	3	2	1	2	—	—	—	—	1.2
eastern kingbird	2	2	1	2	3	2	4	3	1	1P, 1N	2.2
eastern phoebe	—	—	—	—	—	—	—	1	—	—	0.1
prairie horned lark	1	1	1	1	1	—	1	—	—	—	0.6
blue jay	—	—	—	—	—	—	—	—	1	1P	0.2
black-capped chickadee	—	—	—	—	—	1	—	—	—	—	0.1
catbird	4	4	4	1	4	2	3	3	5	1P, 4N	3.5
brown thrasher	2	3	2	3	5	3	2	4	3	3P	3.0
robin	3	3	3	2	5	3	2	2	5	2P, 3N	3.3
bluebird	1	1	1	1	2	1	1	1	1	1N	1.1
cedar waxwing	2	2	2	—	4	1	1	—	1	1N	1.4
red-eyed vireo	—	—	—	—	—	—	—	—	1UM	—	+
warbling vireo	3	3	2	1	1	—	1	—	1	—	1.2
yellow warbler	—	—	—	—	—	—	1	—	—	—	0.1
English sparrow	—	—	2	—	4	4	4	3	3	3P	2.3
eastern meadowlark	4	4	4	4	4	4	4	5	5	7P	4.5
orchard oriole	1	1	1	1	3	1	1	1	1	1N	1.2
Baltimore oriole	1	2	1	—	1	1	1	1	1	1Y	1.0
cowbird	4	6	8	8	5	5	5	5	5	6P	5.7
cardinal	2	2	1	1	1	2	3	1	3	2N	1.8
goldfinch	4	5	8	8	11	5	6	7	5	7P	6.6
red-eyed towhee	4	2	2	—	1	2	2	3	2	1N, 1Y	2.0
grasshopper sparrow	2	2	1	—	2	3	1	4	2	1P	1.8
vesper sparrow	14	16	12	10	13	6	6	10	9	12P, (4N, 3Y)	10.8
chipping sparrow	1	2	1	—	—	—	1	2	1	1P, 1N	1.0
field sparrow	22	25	22	12	25	32 1UM	36	34	31	33P, (34N, 7Y)	27.2
white-throated sparrow	—	—	1?	—	—	—	—	—	—	—	0.1?
song sparrow	10	13	8	4	10	2	2	4	3	4P	6.0
Total species	23	23	25	18	25	24	25	21	25	23	23.2
Total pairs	94	106	98	65	113	90	95	98	95	104	95.8
Density, pairs per 100 acres...	113	128	118	78	136	108 +1UM	114	118	114 +1UM	125	115.3

(*See next page for other tables*)

COMMENT: One of the most interesting observations during the 10 years has been the change of the water level in the pond with its change in the birdlife of that area. This observation is quite typical of many small ponds in southern Michigan. One year, several pairs of rails will nest in them; the next year, no rails at all. A nest of the field sparrow during 1941 was in almost the same identical location of that of a pied-billed grebe during 1943. Another interesting observation has been the annual burning that the area was given during the first seven or eight years that it was studied. The results of these observations will have to be published elsewhere but there has certainly been a much greater success of nests located on the fields not burned, possibly into the second year. Much of the denser vegetation was thus eliminated for a time also, many trees and shrubs dying from the fires. Heavy snows, pressing the vegetation closer to the ground produce a similar effect to burning on nest success. During the 10 years at least 947 nests have been found on the area, consisting of at least 42 different species. Hours spent on the area were as follows: 1938, 175; 1939, 314; 1940, 256; 1941, 71; 1942, 94; 1943, 278; 1944, 272; 1945, 262; 1946, 61; and 1947 (to date), 39. Total, 1822 hours.—LAWRENCE H. WALKINSHAW, Battle Creek, Mich.

Woodlots (12 acres).	'38	'39	'40	'41	'42	'43	'44	'45	'46	'47	Ave.
red-shouldered hawk	—	—	—	—	—	1	1	—	—	—	0.2
screech owl	1	1	1	—	—	—	—	—	—	—	0.3
great horned owl	—	—	—	—	—	—	—	1	1	1Y	0.3
ruby-throated hummingbird	2	2	1	1	—	1	1	2	1	1P	1.2
red-headed woodpecker	2	1	1	2	1	3	3	3	3	3Y	2.2
flicker	1	1	1	—	1	2	1	2	1	1N	1.1
hairy woodpecker	—	—	—	—	1	1	1	1	1	1P	0.6
downy woodpecker	—	1	—	—	2	1	1	1	1	1P	0.8
eastern kingbird	—	—	—	—	—	—	—	—	1	—	0.1
crested flycatcher	3	3	2	3	1	1	1	2	2	2P	2.0
least flycatcher	—	—	—	—	—	—	—	—	1UM	—	+
wood pewee	3	3	2	2	2	3	5	4	2	2P	2.8
crow	—	—	—	—	—	3	2	—	—	—	0.5
black-capped chickadee	—	—	—	—	—	1	1	1	1	1P	0.5
tufted titmouse	—	—	—	—	—	1	1	1	—	—	0.3
white-breasted nuthatch	—	—	—	—	—	1	1	1	1	—	0.4
house wren	—	1	—	—	1	1	1	1	1	1P	0.7
bluebird	1	1	1	1	1	2	3	2	2	1P, 1N	1.6
starling	—	—	—	—	2	3	2	2	—	1N	1.0
red-eyed vireo	—	—	—	—	—	1UM	1UM	—	—	—	0.1
scarlet tanager	—	—	—	—	—	—	—	—	1UM	—	+
indigo bunting	2	3	3	4	4	2	1	—	—	—	1.9
red-eyed towhee	5	5	6	4	4	2	2	3	5	3P, 2Y	4.1
Total pairs	9	11	9	7	11	18	18	15	16	13	12.7
Total pairs on 12 acres	20	22	18	17	20	29 1UM	28 1UM	27	23 2UM	22	22.8
Density, pairs per 100 acres	167	183	150	142	167	246	237	225	200	183	190.0

Pond (5 acres).	'38	'39	'40	'41	'42	'43	'44	'45	'46	'47	Ave.
pied-billed grebe	—	—	—	—	—	1	—	—	—	—	0.1
green heron	—	—	—	—	—	1	—	—	—	—	0.1
American bittern	—	—	—	—	—	1	—	—	—	—	0.1
Virginia rail	—	—	—	—	2	—	—	—	—	—	0.2
sora rail	—	—	—	—	2	1	—	—	—	—	0.3
woodcock	1	1	1	—	—	—	—	—	—	—	0.3
alder flycatcher	1	—	1	—	—	2	1	—	1	2P	0.8
short-billed marsh wren	—	—	—	1	—	—	—	—	—	—	0.1
long-billed marsh wren	—	—	—	—	2	—	—	—	—	—	0.2
catbird	—	—	—	—	—	—	—	—	—	1P	0.1
yellow warbler	1	1	1	1	1	1	1	1	1	1P	1.0
yellow-throat	2	2	2	1	3	1	2	1	2	2P	1.8
red-wing	—	—	—	—	4	5	4	—	1	2P	1.6
song sparrow	2	2	2	—	2	2	2	2	2	2P	1.8
Total species	5	4	5	3	7	9	5	3	5	6	5.2
Total pairs on 5 acres	7	6	7	3	16	15	10	4	7	10	8.5
Density, pairs per 100 acres	140	120	140	60	320	300	200	80	140	200	170.0
Field Sparrow Pairs Using Both Woodlots and Fields.											
field sparrow	?	12	8	9	9	13	13	14	12	10 1UM	11.1
Field Sparrow Pairs Using Both Fields and Pond Area.											
field sparrow	—	—	1	1	—	—	—	—	—	—	0.2
Total species (100 acres)	34	35	36	27	40	47	44	36	42	38	37.9
Total pairs (100 acres)	121	146	132	95	158	147	146	143	137	146	137.1
Density, pairs per 100 acres	121	146	132	95	158	147	146	143	137	146	137.1

27. POND AND BORDER. An area (15.3 acres) of briers, thorns, and small trees including 4½ acres of water and ½ acre of cattails in the North Chagrin Metropolitan Park, 10 miles east of the city limits of Cleveland, Ohio. It was described last year, the fourth year of the census. The only change is in the slight increase in the cattail area each year. COVERAGE: Constant from April 1 to August 15. WEATHER: Unusually wet and cold April and May. CENSUS (A tame mallard raised 5 young):

	'43	'44	'45	'46	'47
woodcock	—	—	1	1	1Y
green heron	1	1	—	—	—
least bittern	1	2	—	—	—
Virginia rail	1	1	1	1	1N, 1Y
mourning dove	1	1	3	2	1P, 1Y
yellow-billed cuckoo.	—	—	—	—	1P
black-billed cuckoo.	—	1	—	—	—
kingbird	—	—	1	—	—
phoebe	1	—	1	1	—
alder flycatcher ...	5	3	11	8	3P, 5Y
catbird	3	7	5	5	1P, 7Y
brown thrasher ...	1	1	1	1	1Y
robin	1	5	8	7	3N
cedar waxwing	—	1	—	3	1P, 2Y
red-eyed vireo	—	—	1	—	—
yellow warbler	8	8	5	4	1P, 6Y
yellow-throat	2	5	4	3	6P
red-wing	43	25	17	21	25 (23Y, 41N)
cowbird	x	x	x	1	x
goldfinch	x	x	5	1	1P, 1Y
towhee	—	2	1	3	2P
field sparrow	1	1	1	6	4P
song sparrow	6	9	15	10	7P, 3Y
Total species ..	16	18	17	18	17
Total pairs ...	75	73	80	79	85
Density, pairs per 100 acres..	490	477	523	516	555

CONSTANT VISITORS: 1 pair green herons, 1 pair cliff swallows, rough-winged and barn swallows. COMMENT: No two of us who send in censuses which include red-wings seem to figure the pairs in the same manner. Before the vegetation gets too high I think I find most of the nests, and from that I figure the greatest number of active nests on any one day.—VERA CARROTHERS, Cleveland Museum of Natural History.

28. WOODED ALDER SWAMP AND POND. An ungrazed tract of 20 acres containing a shallow pond of 3 acres, dry in summer; located in Newbury, Orange County, Vermont; fully described and censused for the first time in 1942. Larger forms of vegetation consist mostly of shrubs; hoary alder comprises 75%. COVERAGE: May 17; June 1, 8, 15, 29; July 23. Total 12 hours. CENSUS: (*indicates permanent resident): Pied-billed grebe, 1P; black duck, 1Y; wood duck, 1P; hooded merganser, 1Y; flicker, 1Y; *downy woodpecker, 1P, 1Y; kingbird, 1Y; alder flycatcher, 1P, 2Y; *crow 1Y; *black-capped chickadee, 2Y; catbird, 1Y; robin, 1P; veery, 3P; cedar waxwing, 3P; starling, 1Y; red-eyed vireo, 3P; black and white warbler, 1P; chestnut-sided warbler, 3Y; yellow-throat, 6P; redstart, 1P, 1Y; red-wing, 2Y; Baltimore oriole 1Y; purple finch, 1P; goldfinch, 4P; swamp sparrow, 1P; song sparrow, 3P, 5Y. TOTAL: 27 species, 56 pairs. DENSITY: 280 pairs per 100 acres. FREQUENT VISITORS: crested flycatcher 1P; bluebird, 1P; red-wing, 1P; indigo bunting, 1P. COMMENT: The number of breeding pairs fell from 67 last year to 56 this year. A possible explanation lies in the wetness of the season. Total precipitation for the months of May, June and July, 1947, amounted to 16.56 inches. Until about July 10, the level of the pond was at least 3 feet above normal. This greatly reduced the wooded margins. It seems significant in view of this that the red-wing population fell from 8 pairs in 1946 to 2 pairs in 1947 and the nesting swamp sparrows from 3 pairs to 1 pair. Perhaps the increased dampness of nearly all the tract may also account for the absence of the ruffed grouse.—WENDELL P. SMITH, Wells River, Vt.

29. POND AND WET, SPARSELY-WOODED MEADOW. About 18 acres of meadow mostly wet to inundated; pond of about 7 acres bordered by cattail-rush-smartweed community lightly interspersed with rose, willow, and buttonbush brush. North periphery of wet area supports elm, willow and hazel scrub while higher and drier parts have thin stands of sumac, hickory and sassafras. Open water 1-6 ft. deep with mud bottom. Besides cattails *(Typha latifolia)* growing from water, other aquatics are a *Rumex* sp., *Ranunculus longirostris*, and *Polygonum coccineum*. Entire area grazed by eight head of livestock. SIZE: 24.6 acres of which 6.8 acres is open water. Water area fluctuates slightly with rainfall. LOCATION: NW¼, NW¼, S13, T23N, R5W, Tippecanoe County, Indiana. Area locally known as Ross's or Blackbird pond and found 1 mile west of West Lafayette. TOPOGRAPHY: About 660 ft. above sea level, area consists of a shallow basin with higher ground on east and west sides. Pond fed by intermittent stream from north and water level maintained by low earth dam just outside study area on the south. SURVEYS: During migration, observations on shorebirds and waterfowl made more or less continuously last 6 years. Annually covered on spring and Christmas censuses. COVERAGE: Visited May 3, 22, 29; June 5, 15, 25; July 9, 13, 22, 27; hours varying from 4:20 a.m. to 5:00 p.m. (CST); by two observers for a total of 38 man-hours of observation. WEATHER: Temperatures for May and June were variable but both months averaged more than 3 degrees below normal. Rainfall in June more than an inch above normal and nearly so in May. July temperatures considerably below normal with subnormal precipitation. CENSUS: Least bittern, 7N; king rail, 1N; mourning dove, 2N; yellow-billed cuckoo, 1N; kingbird, 2N; long-billed marsh wren, 2P (1 nest with eggs and 7 "cock" nests); bobolink, 1M; red-wing, 59 equiv. pairs (71N—3 females to 2 males); indigo bunting, 1M; dickcissel, 3M; grasshopper sparrow, 1M; song sparrow, 3M (2N), TOTAL: 12 species, 83 pairs. DENSITY: Assuming all species to be evenly paired except red-wings, the density is 337 pairs per 100 acres. VISITORS: Great blue heron, green heron, black-crowned night heron, blue-winged teal, wood duck, red-tailed hawk, ring-necked pheasant, killdeer, black tern, chimney swift, ruby-throated hummingbird, belted kingfisher, downy woodpecker, crested flycatcher, phoebe, wood pewee, barn swallow, purple martin, short-billed marsh wren, catbird, robin, starling, yellow-throat, yellow-breasted chat, meadowlark, bronzed grackle, cowbird, cardinal, goldfinch. COMMENT: For the entire census period a total of 154 red-wing nests were found and individually marked. It was im-

possible to separate initial nestings from second nests or renesting following desertion. On June 15, a total of 90 nests was observed. Close observations before and after this date indicated that 71 were actively attended. Thus this is our figure for breeding females, but at no time were this many males seen. Cowbird parasitism of the red-wing nests occurred twice.—C. M. KIRKPATRICK and I. W. BURR, Purdue University, Lafayette, Ind.

30. UPLAND FOREST SWAMP AND MARSH. An area of approximately 20 acres located in the northwest corner of Portage County, Ohio, ¼ mile east of The W.&L.E.R.R. and ¼ mile south of Davis Crossing Road in the southwest corner of Aurora Township; altitude 1000 ft. EDGE: Provided by open fields and hawthorn thickets along the northern boundary; by beginning of higher ground to the west growing to hawthorn thickets, open fields, and numerous small swampy areas of cattail, buttonbush, sedge and rush. Fully described in 1946, the first year of the census. There were no changes in the vegetational conditions other than several windfalls. COVERAGE: April 4, 8, 11, 15, 17, 23, 28; May 1, 6, 10, 12, 17, 19, 22, 27, 31; June 4, 12, 17, 20, 24; July 2, 8, 12, 18, 29; August 9; hours varied from 5:45 a.m. to 5:00 p.m. and totaled approximately 145. WEATHER: January was mild, the warmest in 10 years, with an excess of precipitation of almost 2 inches. February was the coldest in 11 years. While snow squalls were frequent, accompanied by winds, there were no storms of destructive character. March continued cold, and on the 25th and 26th a severe blizzard occurred, with wind velocity of 55 miles per hour. April, May and to the middle of June were extremely wet, April being the wettest in 18 years, and May the wettest in 54 years. Heavy killing frosts occurred on April 29 and May 10, and in this area there was a light frost on June 4. The second half of June was more normal, while July was characterized by wet and erratic weather. By August, the accumulated rainfall amounted to 30.52 inches, compared with a normal of 19.86, and there was a deficiency of temperature of 43° (U.S. Weather Bureau at Cleveland Airport). The first nine days of August were dry and extremely warm. CENSUS: Mallard, 1P (1N); yellow-billed cuckoo, 2P (2N); ruby-throated hummingbird, 2P (1N); downy woodpecker, 1P; wood pewee, 2P (1N); black-capped chickadee, 2P (2N); tufted titmouse, 1Y; white-breasted nuthatch, 1P; house wren, equiv. 2P (1P, 2UM); catbird, 5P (8N); robin, 1P (1N); wood thrush, 2P (2N); veery, 1P; cedar waxwing, 2P; red-eyed vireo, 2P (2N); Grinnell's water-thrush (incorrectly identified in 1946 as the Louisiana water-thrush), 2P (2N); yellow warbler, 8P (13N); yellow-throat, 2P; yellow-breasted chat, 1P (1N?); redstart, 1P; cowbird, 2P; scarlet tanager, 2P (1N); cardinal, 2P (3N); goldfinch, 2P (1N); red-eyed towhee, 2P (1N); swamp sparrow, 2P (1N); song sparrow, 8P (4N). TOTAL: 27 species, 61 pairs (including pair equivalent). DENSITY: 305 pairs per 100 acres (405 pairs in 1946). BIRDS NESTING IN AREA AND FEEDING PARTLY OUTSIDE: ruby-throated hummingbird; black-capped chickadee; tufted titmouse; robin; wood thrush, (1P); veery; cedar waxwing; redstart; cardinal; goldfinch; red-eyed towhee. FREQUENT VISITORS: great blue heron (colony ⅛ mile south), green heron, 1PY; black duck, 1P; wood duck, 1P; turkey vulture, ¾; Cooper's hawk, 1; red-tailed hawk, 1; red-shouldered hawk, 1P (nest ¼ mile west); marsh hawk, 1P (nest ¼ mile north); woodcock, 1P; mourning dove, 1P; black-billed cuckoo (nest 100 yards west); belted kingfisher (one visit in woods); flicker, 1P; pileated woodpecker, 1P (nest 100 yards southeast); hairy woodpecker, 1P; phoebe, 1P; alder flycatcher, 1M; purple martin, numerous; blue jay (nest 100 ft. north); crow, 1P; brown thrasher, 1Y; bluebird, 1Y; blue-winged warbler, 2P (along west edge); oven-bird, 2P (on west and north edge); red-winged blackbird, 2P; Baltimore oriole, 1MY; rose-breasted grosbeak, 1P. COMMENT: We are able to come to no definite conclusion with respect to the decline in pairs per 100 acres from 405 to 305. It may be the result of experience or a more conservative estimate. Our impression is, however, that there were actually fewer of such species as the catbird, yellow warbler and song sparrow and there was no evidence of nesting of eight species. There was an addition of four species found or assumed to be nesting, a net loss of four species over 1946. The determination of the number of pairs was based on the Williams spotting method coupled with actual nests found.—CARL F. HAMANN, Aurora, Ohio.

31. SHRUBBY FIELD WITH STREAM-BORDERED TREES. First described and censused in 1946. Additional descriptive notes follow: The triangular-shaped woods near one corner of the area consists of one or a few specimens of the following trees: 45-80 ft. (5 in. to 3 ft. DBH) sycamore *(Platanus occidentalis)*, 45 ft. (6 in. DBH) black locust *(Robinia Pseudo-Acacia)*, 45 ft. silver maple *(Acer saccharinum)*, 80 ft. (2 ft. DBH) tulip tree *(Liriodendron tulipifera)*, and 60 ft. (2 ft. DBH) cotton-wood *(Populus deltoides)*. The understory consists of an open stand of sycamore, mulberry *(Morus* sp.*)*, box elder *(Acer Negundo)*, elm *(Ulmus* sp.*)*, beech *(Fagus grandifolia,)* and hickory *(Carya* sp.*)*. A few trees (mostly understory ones) were cut last winter. The ground is covered with Japanese honeysuckle *(Lonicera Japonica)* and there are a few living and dead, mostly honeysuckle-covered saplings (mostly of black locust and elm). A .2 acre grove of 65-70 ft. (about 14-22 in. DBH) sugar maples *(Acer saccharum)* is near the woods. In the approximately 3 acres of trees other than in the triangular-shaped woods and maple grove (situated along the stream and elsewhere), silver maple and black locust are abundant additional species. There is an additional rivulet running across the area and a ditch extending a third of the distance across. One rivulet is bordered by smooth sumac *(Rhus glabra)*, weeds and saplings. The other rivulets are bordered at least part of their distance by sapling trees of the following species: black locust, sycamore, cotton-wood,

American elm *(Ulmus americana)*, willow *(Salix* sp.*)*, and black walnut *(Juglans nigra)*. Some additional species of shrubs in the open area are: false indigo *(Amorpha fruticosa)*, smooth sumac, and common elder *(Sambucus canadensis)*. Some additional herbs in the open are: rushes *(Juncus* sp.*)*, bulrush *(Scirpus atrovirens)*, great bulrush *(S. validus)*, *Steironema ciliatum*. bouncing bet *(Saponaria officinalis)*, blue vervain *(Verbena hastata)*, and common burdock *(Arctum minus)*. About .6 acre has been denuded of its former herbaceous vegetation and is being used as a dumping ground for shade tree trimmings. (Botanical nomenclature follows Gray's "Manual".) SIZE: The area was more carefully mapped this year and found to be 19.2 acres (2188 ft. average length by 382 ft. average width, paced). Therefore, the 75 pairs found last year yield a density of 391 pairs per 100 acres instead of the 500 pairs reported. EDGE: About 8,500 ft. consisting of a triangular-shaped woods near one end, a sugar maple grove, and groups of mostly sapling trees along the stream, the rivulets and ditch, and elsewhere. COVERAGE: March 22, 31; April 7, 27; May 5, 12, 26, 31; June 2, 7, 8, 14, 15, 17, 28; July 2, 10, 12, 20, 23, 26; and August 1-7. Total, about 65 hours. The hours varied from 5:30 a.m. to 6:45 p.m. EST, trips usually being 2-4 hours between 5:30 and 10:30 a.m. EST. About 55 additional hours (same days plus August 20, September 7, and September 23) were spent searching for nests, photographing, describing the area, and measuring and pacing the locations of the nests and the dimensions of the area. The locations of birds were also plotted on maps while this other work was being done. WEATHER: Weather records from the Baltimore City Office were used. The winter was unusually warm, the mean December temperature being 5.2° above normal and the mean January temperature 7.6° above normal. The ground was virtually clear all winter until February 20-21, when 10.5 inches of snow fell in 24 hours. The ground remained covered until March 6. The mean February temperature was 3.6° below normal. Although the mean March temperature was almost normal, the only periods that the mean temperature was at or above normal in March were March 12-15 and 21-25. From April through July the monthly mean temperatures were about normal. Precipitation was below normal in December, normal in January, below normal in February and March, and about twice as great as normal in April. It was normal in May and July, and twice as great as normal in June. CENSUS, PAIRS NESTING AND FEEDING LARGELY WITHIN THE STUDY TRACT: Catbird, 7N, 2P; robin, 3P, 1Y; wood thrush, 1N; bluebird, 1N; red-eyed vireo, 1N; warbling vireo, 1N; yellow warbler, 5M, 1P, 3Y; yellow-throat, 9M, 2P; yellow-breasted chat, 3M, 2N, 2P; redstart, 3M; red-wing, 7N (1N); orchard oriole, 1M: Baltimore oriole, 2N; cardinal, 1P; indigo bunting, 1M, 1N, 1P; goldfinch, 3N, 1P; towhee, 1P; song sparrow, 10M, 8N, 3P. TOTAL: 18 species, 87 pairs. DENSITY: 453 pairs per 100 acres (391 in 1946). CENSUS, PAIRS PROBABLY NESTING ON THE AREA BUT SECURING MUCH FOOD OUTSIDE OF IT: Black-billed cuckoo, 1P; cowbird, 1P; cardinal, 1P. TOTAL: 3 species, 3 pairs. GRAND TOTAL: 20 species, 90 pairs. FINAL DENSITY: 469 pairs per 100 acres. BIRDS FEEDING ON THE AREA BUT PROBABLY NESTING ELSEWHERE (FREQUENT VISITORS): Chimney swift, 15±; downy woodpecker, 2; kingbird, 2P; phoebe, 1P; wood pewee, 2; rough-winged swallow, 5±; barn swallow, 8; tufted titmouse, 1P; house wren, 1M; catbird, 1P; cedar waxwing, 1Y; white-eyed vireo, 1M; warbling vireo, 1M; English sparrow, 5±; orchard oriole, 1P. This was a project of the Maryland Ornithological Society.—FLORENCE H. BURNER, ELEANOR G. COOLEY, ORVILLE W. CROWDER, ALICE S. KAESTNER, WILLIAM S. MCHOUL, CHANDLER S. ROBBINS, STEPHEN W. SIMON, ROCKWELL SMITH, HERBERT P. STRACK, LOLA G. STRACK, WILLARD A. STRACK.

32. GRAZED, ROLLING GRASSLAND WITH EDGE. A grassland area with two small clumps of trees which was fully described and censused for the first time in 1946. This year there are only 19 cattle ranched on the area. Since the last report the gravel pit which had not been used for years, was used extensively late last summer and again this season beginning in July. This disturbance is, I believe, the reason that the final density is less than last year. The work at the pit has stopped now (Aug. 8) so the density will likely be greater next year. SIZE: About 40 acres. LOCATION: Verulam Township, Victoria County, Ontario, Canada. COVERAGE: March 26, 28; April 12, 15, 22, 28; May 2, 9, 16, 23, 26, 28, 30; June 2, 6, 11, 18, 24; July 2, 11. Hours varied from 7:30 a.m. to 9:30 p.m. and totaled 69. Every morning and evening, Monday to Friday, I passed the area and watched from the road as well. WEATHER: The snow was very deep and the winter very long this year; in fact the snow was not gone until nearly the first of April. During the spring the rainfall was rather heavy and one of the ponds flooded over the field and formed a miniature lake which was visited several times by ducks on their way north. The crows, horned larks and starlings were back in March but the other birds did not begin to return until April. CENSUS, PAIRS NESTING AND FEEDING WITHIN THE STUDY AREA: Killdeer, 2P; spotted sandpiper, 1N; flicker, 1N; bank swallow, 5N; crow, 1P; starling, 2N, 1Y; meadowlark, 2N, 2P; savannah sparrow, 1P; chipping sparrow, 1N; song sparrow, 1Y. TOTAL: 10 species, 20 pairs. DENSITY: 50 pairs per 100 acres. PAIRS NESTING WITHIN THE AREA BUT FEEDING LARGELY OUTSIDE IT: Brown thrasher, 1Y; robin, 1Y, 1N; bluebird, 1N. TOTAL: 3 additional species, 4 pairs. GRAND TOTAL: 13 species, 24 pairs. FINAL DENSITY: 60 pairs per 100 acres. FREQUENT VISITORS: Sharp-shinned hawk, 1P; black tern, 3P; yellow-bellied sapsucker, 1P; migrant shrike, 1P; red-winged blackbird, 6P.—MARGARET HOLLIDAY, Fenelon Falls, Ont.

33. CEMETERY WITH EDGE EFFECT. Area described in 1944 and 1945. SIZE: 88 acres. LOCATION: Forest Hill Cemetery, Madison, Wisconsin. WEATHER: Cold and wet during April and May. COVERAGE: Census trips during January, February

and March. Nesting trips (14) between April 18 and June 16; total, 54½ hours. CENSUS: Mourning dove, 19N; flicker, 3N; red-headed woodpecker, 2N; wood pewee, 5M; blue jay, 2Y; crow, 2N; white-breasted nuthatch, 2P; house wren, 1N; catbird, 5N; brown thrasher, 2N, 1M; robin, 36N, 18P; starling, 19Y; English sparrow, 1N; Baltimore oriole, 2N; bronzed grackle, 1N; cowbird, 4P; cardinal, 2N; rose-breasted grosbeak, 1M; indigo bunting, 2M; goldfinch, 3P; chipping sparrow, 1N, 4P; song sparrow, 1N, 1P. TOTAL: 22 species, 140 pairs. DENSITY: 159 pairs per 100 acres. OTHER SPECIES FEEDING ON AREA AND PERHAPS NESTING: Killdeer, screech owl, nighthawk, crested flycatcher, cedar waxwing, red-eyed vireo, yellow warbler, eastern meadowlark. COMMENT: Severe nesting conditions in 1945 seem to have caused a slump in the population; very severe in 1946, but building back in 1947.—MRS. ARTHUR KOEHLER and GEORGE KOEHLER, 109 Chestnut St., Madison 5, Wis.

34. CLIMAX RED AND WHITE SPRUCE FOREST WITH CLEARING. The area of 30 acres, called Audubon Peninsula on Hog Island, Muscongus Bay, Maine (site of the Audubon Nature Camp) consists of 25 acres of climax spruce and 5 partially cleared acres containing buildings, birch, bushes, ferns and young spruce. Described in detail in earlier reports and censused from 1936 through 1942, and again in 1946. Since the last report many small spruces around the buildings were cleared away. COVERAGE: Several hours almost daily from early June to mid-August by 2 census takers plus numerous assistants. Total, over 160 man-hours. WEATHER: The spring was the wettest in a decade. The summer was very dry and exceptionally hot. CENSUS: Osprey, 1N; tree swallow, 1N; crow, 3N; black-capped chickadee, 2N (1N), 2Y (1Y); red-breasted nuthatch, 1N; robin, 2N (1N); hermit thrush, 1N (1N), 1Y; olive-backed thrush, 1N (1N), 2Y (1Y), 1M; golden-crowned kinglet, 4Y, 3M; parula warbler, 4N (2N), 4Y (1Y), 2M; magnolia warbler, 1N, 3Y (1Y), 3M; myrtle warbler, 2N, 4Y, 3M; black-throated green warbler, 4N, 3Y (3Y), 4M; Blackburnian warbler, 3Y, 3M; redstart, 1N, 1Y (1Y); slate-colored junco, 2N (1N), 3Y (2Y); chipping sparrow, 1N; song sparrow, 3N (2N), 2Y (1Y); starling, 1N. TOTAL: 19 species, 82 pairs. DENSITY: 273 pairs per 100 acres. Of the 82 pairs, 19 represent males seen or heard regularly on territories but with no further evidence of nesting. COMMENT: The following birds fed outside the census area: the ospreys in the waters of the bay often 2 miles from the nest, the crows on the tidal flats, mussel bars and neighboring islands. Naturally, many species not breeding on the peninsula were recorded. Transients were most conspicuous in early June and again in August. Being on an island, numerous waterbirds (gulls, ducks, terns, guillemots, loons, cormorants, shorebirds) were frequently seen. Wide ranging birds, such as herons, ravens, swifts and swallows were of regular occurrence. The vagrant population was variable. Such species as the Nashville warbler, black and white warbler, pine siskin, red crossbill and cedar waxwing would often show up for a day or so and then move on. The starlings which nested in a crevice of one of the buildings established the first breeding record for this species on Hog Island. The partially cleared 5 acres with its buildings induces such species as the starling, song sparrow, tree swallow and robin to breed on our peninsula.—JOSEPH CADBURY and ALLAN D. CRUICKSHANK, Audubon Nature Camp, Medomak, Maine.

35. MATURE DECIDUOUS FLOOD PLAIN FOREST WITH OPENINGS. A mature woodland about 100 years old on an extremely narrow island in the gorge of the Potomac River, between the river and the Chesapeake and Ohio Canal. First reported and fully described in 1946. SIZE: 15.25 acres, computed from National Park Service maps. The tract is 3600 ft. long and between 50 and 400 ft. wide. LOCATION: Glen Echo, Montgomery County, Maryland, 2 miles northwest of the District of Columbia line, in the C. and O. Canal unit of the National Capital Parks. Bounded on the southwest by a channel of the Potomac River, 50 to 250 ft. wide, which lies between this tract and a chain of three long, rather narrow, and similarly wooded islands, and on the northeast by the C. and O. Canal, beyond which is a narrow strip of flood plain forest opposite the entire area. TOPOGRAPHY: Practically flat except for a slough near the center and a rise of about 10 feet to the canal towpath. ELEVATION: 40 to 50 ft. above sea level, and averages 6 to 8 ft. above the usual level of the Potomac River. EDGE: Provided by the river, 3600 ft.; the canal, 3600 ft.; and two openings, 800 ft.; total, 8000 ft., or 525 ft. per acre. COVERAGE: Completely covered: April 26; May 3, 10, 11, 16, 18, 26; June 1, 7, 21, 29; July 4, 6, 13, 14, 20. Partly: May 17, 24, 30, 31; June 15, 28. Hours varied from 4 a.m. to 7:20 p.m. (E.S.T.) Total hours: 60. WEATHER: See accompanying report for Cabin John census (No. 23). CENSUS: Ruby-throated hummingbird, 1F (probably 1 or 2 others); flicker, 1N; red-bellied woodpecker, 1P; downy woodpecker, 1N-Y, 1P (2); crested flycatcher, 1P; Acadian flycatcher, 6P; wood pewee, 3P; Carolina chickadee, 3Y; tufted titmouse, 2Y, 1 2/2M (4); white-breasted nuthatch, 3P; Carolina wren, 2Y; catbird, 3P; wood thrush, 4P; blue-gray gnatcatcher, 3P; yellow-throated vireo, 1P; red-eyed vireo, 2Y, 3 2/2P, 5M (11); parula warbler, 1N-Y, 1P, 8M (10); Louisiana waterthrush, 1Y, 1P (2); Kentucky warbler, 3P; yellow-throat, 1Y, 3P (4); redstart, 1N, 1Y, 5½P, 2 3/2M (11); cowbird, 1P; scarlet tanager, 1P; cardinal, 2N, 1Y, 1P (4); indigo bunting, 1P; goldfinch, 1P; song sparrow, 1P, 1M (2). TOTAL: 27 species, 89 pairs. DENSITY: 583 pairs per 100 acres. FEEDING OUTSIDE TRACT: Starling, 1N-Y, 3P (4). FINAL TOTAL: 28 species, 93 pairs. FINAL DENSITY: 609 pairs per 100 acres. FREQUENT VISITORS: Great blue heron, 1P, imm.; green heron, 1P; wood duck, 1-2P; spotted sandpiper, 2-3P; mourning dove, 1P; yellow-billed cuckoo, 1P; black-billed cuckoo, 1P; barred owl, 1P; belted kingfisher, 1P; pileated woodpecker, 1P; red-bellied woodpecker, 1-2P; downy woodpecker,

1P; crested flycatcher, 3P; phoebe, 1P; blue jay, 3-4P; crow, 2-3P; Carolina chickadee 1P (Y); tufted titmouse, 2P; white-breasted nuthatch, 1P; house wren, 2P; Carolina wren, 2P; catbird, 1P; robin, 2P; wood thrush, 3P; blue-gray gnatcatcher, 2P; white-eyed vireo, 2P; yellow-throated vireo, 2P; red-eyed vireo, 2P; black and white warbler, 2P with young; prothonotary warbler, 3P; parula warbler, 1-2P; Kentucky warbler, 2P; yellow-throat, 2P; yellow-breasted chat, 1P; redstart, 3P; English sparrow, 1-2P; purple grackle, several P; scarlet tanager, 2P; cardinal, 3P; indigo bunting, 1P; goldfinch, 1-2P; song sparrow, 3P. FREQUENTLY OVERHEAD: Turkey vulture, chimney swift, rough-winged swallow. COMMENT: Although this project is believed to have an abnormally high concentration of breeding birds resulting from excessive edge-effect, it was reworked this year in conjunction with the nearby, more compact Cabin John Island (Census No. 23). Practically no difference was found, however, the island having only one less pair per 100 acres than this tract (608 vs. 609). But if the starlings, which feed principally outside in both cases, are omitted, the native bird density of this tract is 583 pairs, compared with 533 for the island. A revision of the 1946 census based on the 1947 study indicates a final total of 104 pairs, or 681 per 100 acres. (Original estimate: 107, or 701 per 100 acres.) Revisions follow: Downy woodpecker, 3-4 to 3; Acadian flycatcher, 10-11 to 10; tufted titmouse, 4-5 to 4; white-eyed vireo, 2-3 to 1; yellow-throated vireo, 1-2 to 1; red-eyed vireo, 10-14 to 11; and parula warbler, 11 to 10.—PHILLIS BURCH, ELEANOR COOLEY, HELEN JOHNSTON, WILLIAM KIRSHER, CHANDLER S. ROBBINS, E. JEANNE STIVERS, DONALD M. THATCHER.—Audubon Society of the District of Columbia.

36. OAK-HICKORY FOREST, PINE STAND AND EDGE. This census report represents the tenth year of a breeding-bird count upon a 35-acre area located in Eden Township, Licking County, Ohio. The census tract is part of a Boy Scout camp and has been described in earlier reports. The vegetational pattern is divided into the following main sections: (1) upland oak-hickory woodland; (2) mixed mesophytic woodland on the valley slope; (3) planted pine and spruce areas; (4) a narrow margin of flood-plain containing a small spring-fed pond. This year there were only three noticeable ecological changes brought about by (1) down timber, represented by three dead chestnut trees, average DBH ten inches; black oak, DBH 20 inches; red oak, DBH 11 inches; three large-toothed aspen, DBH 6 inches; by (2) more pruning in the pine planting which is now roughly two-thirds pruned; and by (3) a drainage-ditch modification which involved enlarging the original ditch draining the pond area to an average width of eight ft. and a depth of three ft. The earth from this ditch was spread out over the adjacent east bank and floodplain, except for a few piles three to four ft. high which were still present on the last coverage. The widespread clearing in the summer of 1945 seems to have been a factor in the reduction of at least one species in this census. The area cleared is now supporting a rich vegetative cover of varied species of herbaceous plants, shrubs, and deciduous seedlings. COVERAGE: Some trips of short duration in the winter months plus survey on May 2, 22, 24, 25; continuous presence from 11 a.m. on May 30 to 2 p.m. on June 2; 7 p.m. on June 3 to 1 p.m. on June 5; 7 p.m. on June 10 to 7 p.m. on June 12. Total hours, 230. EDGE: No change of apparent importance from last year. The clearing of 1945, while it did not alter the major edges, decidedly modified what might be called the "secondary edges" of the understory of shrubs and saplings. REGULAR VISITORS: Yellow-billed cuckoo, 1; black-billed cuckoo, 1; chimney swift, 4; ruby-throated hummingbird, 2; pileated woodpecker, 1; downy woodpecker, 2: crested flycatcher, 1; phoebe, 2; Acadian flycatcher, 4; wood pewee, 4; blue jay, 1; crow, 6; Carolina chickadee, 2; tufted titmouse, 2; Carolina wren, 1; robin, 2; wood thrush, 2; cedar waxwing, 2; red-eyed vireo, 6; black and white warbler, 2; blue-winged warbler, 2; cerulean warbler, 2; oven-bird, 4; Louisiana water-thrush, 2; Kentucky warbler, 2; yellow-throat, 1; scarlet tanager, 2; field sparrow, 2; song sparrow, 4; IRREGULAR VISITORS: Great blue heron, 1; green heron, 1; wood duck, 1; Cooper's hawk, 1; red-shouldered hawk, 1; red-tailed hawk, 1; spotted sandpiper, 1; great-horned owl, 1; barred owl, 1; whip-poor-will, 1; nighthawk, 1; chimney swift, 2; kingfisher, 1; flicker, 1; red-bellied woodpecker, 1; hairy woodpecker, 1; kingbird, 1; barn swallow, 2; blue jay, 1; warbling vireo, 1; yellow warbler, 1; red-winged blackbird, 2; Baltimore oriole, 1; summer tanager, 1; goldfinch, 4. COMMENTS: The marked increase of birds on this census area this year is in sharp contrast to the gradual rise in density over the preceding years. Not only was there an increase in the number of nests found, exceeded only by the 1945 census, but there was also a marked increase in the number of pairs for which a nest could not be located. A comparison of the totals in the table will indicate the relative proportion of nests, pairs, and pairs feeding young. To account for this rise in density several contributing factors are evident from the data secured in the census coverage plus those factors operating in a cumulative fashion. The following census data indicate a contribution to the high density of this year's census: (1) edge and special area attraction; (2) marginal choice of about nine pairs of birds; (3) peak densities for red-eyed vireo, Acadian flycatcher, cardinal, wood thrush, dove, downy woodpecker, wood pewee, scarlet tanager, and chipping sparrow; (4) the return of the yellow-breasted chat, towhee, and Louisiana water-thrush after several years of no breeding evidence; (5) first record for blue-winged warbler as a breeding pair during the ten-year period of this census. This species nested in the area during the first few years of the camp's history. Other factors which probably have influenced this year's density are: (1) two favorable nesting seasons in 1945 and 1946; (2) a probable low level of owl predation; (3) the 1945 clearing of brush and thinning of small saplings could have benefited some species, but certainly was detrimental to at least one species,

	'37	'38	'39	'40	'41	'42	'43	'44	'45	'46	'47	Ave.
ruffed grouse	1	—	—	—	—	1	x	*	*	—	P	0.3
bob-white	1	—	—	—	—	—	x	—	—	—	—	0.1
woodcock	1	—	—	—	—	—	x	—	—	—	—	0.1
mourning dove	—	—	—	1	1	1	x	*	2	5	6N	1.6
yellow-billed cuckoo	—	—	—	—	—	1	x	*	4	1	2P	0.8
black-billed cuckoo	—	—	—	—	—	—	x	—	2	1	P	0.4
screech owl	1	—	—	—	—	1	x	*	*	1	P	0.4
whip-poor-will	1	1	1	1	—	1	x	1	1	1	P	0.9
ruby-throated hummingbird	1	2	2	(1)	2	2	x	2	2	2	3P	1.9
hairy woodpecker	—	1	1	1	—	—	x	—	1	—	P	0.5
downy woodpecker	( )	1	1	1	1	1	x	*	1	1	2N, P	1.0
eastern kingbird	1	—	—	—	—	—	x	—	—	—	—	0.1
crested flycatcher	2	—	—	—	—	1	x	—	*	1	P	0.5
phoebe	1	2[1]	3[2]	(1)	2	3	x	3	3	4	4N	2.6
Acadian flycatcher	1	1	1	1	1	2	x	2	2	3	5N	1.9
wood pewee	1	1	1	1	1	2	x	2	2	2	N, 3P	1.7
bank swallow	—	—	—	—	—	1	x	—	—	—	—	0.1
blue jay	—	—	1	—	1	—	x	*	2	1	*	0.5
crow	—	—	—	—	—	—	x	—	2	1	N	0.4
Carolina chickadee	1	2	1	1	1	2	x	1	1	1	N, P	1.3
tufted titmouse	1	2	1	1	1	2	x	1	1	1	N, P	1.3
white-breasted nuthatch	1	1	1	1	1	1	x	*	1	1	P	0.9
Carolina wren	—	—	—	1	—	1	x	1	1	—	N	0.5
catbird	1	—	—	—	1	—	x	*	1	1	N	0.5
robin	—	—	—	1	2	1	x	1	3	1	N, Y, P	1.2
wood thrush	( )	1	1	1	2	2	x	2	2	2	4N	1.7
blue-gray gnatcatcher	1	1	1	1	1	1	x	*	1	1	2P	1.0
yellow-throated vireo	—	—	—	1	1	1	x	1	1	1	P	0.7
red-eyed vireo	(2)	3	4	(3)	5	5	x	5	9	6	6N, 4P	5.2
black and white warbler	—	1	1	1	1	1	x	1	*	—	—	0.6
blue-winged warbler	—	—	—	—	—	—	x	—	—	—	P	0.1
cerulean warbler	1	2	2	(1)	2	2	x	2	1	2	3P	1.8
oven-bird	1	2	2	2	2	2	x	2	2	3	3P	2.1
Louisiana water-thrush	1	1	1	1	1	1	x	( )	*	—	N	0.7
Kentucky warbler	2	2	2	(1)	2	2	x	2	3	1	2P	1.9
yellow-throat	—	1	1	—	—	—	x	—	*	—	*	0.2
yellow-breasted chat	(1)	1	1	—	—	—	x	—	—	—	P	0.4
cowbird	1	1	1	1	1.5	3	x	2	2	1	2P	1.6
scarlet tanager	1	2	1	1	1	2	x	1	1	2	N, 2P	1.5
summer tanager	—	—	—	—	—	—	x	*	1	1	*	0.2
cardinal	2	2	2	(1)	2	1	x	2	3	1	4N	2.0
indigo bunting	2	2	3	(2)	4	1	x	1	3	2	P	2.1
goldfinch	—	1	1	1	—	—	x	—	—	—	—	0.3
red-eyed towhee	2	2	1	1	1	1	x	—	—	—	P	0.9
chipping sparrow	1	1	—	1	—	1	x	1	2	2	4N	1.3
field sparrow	1	3	3	(1)	—	1	x	—	*	1	N	1.1
song sparrow	—	—	—	—	—	1	x	1	1	2	2N	0.7
Total species	29	28	28	30	26	34	x	*23;* 32	32	33	38	31.0
Total pairs	35	43	42	34	41.5	52	x	*38;* 47	64	57	90	50.6
Density, pairs per 100 acres...	100	123	120	98	119	149	x	*109;* 140	183	163	257	145.2

[1-2] Pairs dropped from the census area on a decision to separate the tract into two separate divisions of (1) upland oak-hickory and (2) buildings and bottomlands. A final decision incorporated the building into the ecology of the census area.

[3] An incomplete census showing pairs *actually mapped* and the probable density.

( ) Probably present or at a higher density.

* Species present but nesting evidence lacking.

the indigo bunting; (4) probable late pairing of some species with a nesting site unselected at the last coverage and which could have been selected outside the census area. This was definitely observed in one pair of robins not included in the breeding and nesting section. Another factor or series of closely related factors is probably tied up in the general aging of the woodland. A noticeable change has taken place in the character of the understory in some places, approaching three well-defined levels of trees and shrubs. The crowns of trees have closed in completely in some places and the open space between crowns materially reduced in other places. This aging of the woodland no doubt has a continuous influence in the development or downtrend of the breeding species of birds.—A. H. CLAUGUS, Newark, Ohio.

37. OPEN MIXED HARDWOODS WITH GRASSY CLEARINGS. About 20 acres of open, lightly-grazed woodlot, with thick, rapidly growing undergrowth; 2 grass openings of 2½ and 1½ acres. Located three miles north of Lexington, Virginia. First censused in 1944, and fully described in 1945. COVERAGE: March 24, 27; April 1, 7, 8, 13, 18, 21, 28; May 1, 5, 12, 26: June 2, 15, 30; July 2, 8, 9, 10, 11, 12: August 6, 10, 11, 12. Total hours: 40. WEATHER: Dry in May (⅔ normal) and June (⅓ normal); wet in July. CENSUS: Mourning dove, 1P; yellow-billed cuckoo, 1N, 1P; ruby-throated hummingbird, 2P; downy woodpecker, 1P; crested flycatcher, 1P; phoebe, 2N, 1P; Acadian flycatcher, 1N; wood pewee, 1N, 2P; Carolina chickadee, 4P; tufted titmouse, 4Y; white-breasted nuthatch, 1P; Carolina wren, 1Y,

2P; brown thrasher, 1P; robin, 1P; wood thrush, 1P; bluebird, 1N (2N); blue-gray gnatcatcher, 1N, 2Y, 2P; yellow-throated vireo, 1P; red-eyed vireo, 1N, 1P; black and white warbler, 3P; worm-eating warbler, 1Y; parula warbler, 1Y; cerulean warbler, 3Y; prairie warbler, 1N, 3P; oven-bird, 1P; yellow-breasted chat, 1Y, 2P; redstart, 2Y; English sparrow, 4N (in steel bridge); orchard oriole, 1P; cowbird, 4P; summer tanager, 2P; cardinal, 5N, 3Y, 2P; indigo bunting, 2N, 2P; goldfinch, 1N, 3P; red-eyed towhee, 1P; chipping sparrow, 1N, 2Y, 2P (1P in 1944, 3P in 1945, 8P in 1946); field sparrow, 3N, 2Y, 9P. TOTAL: 37 species, 105 pairs. DENSITY: 525 pairs per 100 acres (530 in 1944, 560 in 1945, 570 in 1946). FREQUENT VISITORS: Green heron, wood duck, chimney swift, kingfisher, pileated woodpecker, red-bellied woodpecker, flicker, crow, mockingbird, Louisiana water-thrush, robin (large flocks in late summer), English sparrow.—J. J. MURRAY, Lexington, Va.

38. PINE BARRENS AND CEDAR BOG. The area (72 acres of pitch pine barrens and 4 acres of cedar bog) is located at Pine Lake Park, Toms River, New Jersey. It is off Route 37, three miles south of Lakehurst, and was censused for the first time in 1938. No forest fire has touched the census tract since 1930, at which time the cedar bog now included in the area was practically wiped out. By the time the census was started (1938), little regrowth had occurred and only a few coast white cedars *(Chamaecyparis thyoides)*

	'38	'39	'40	'41	'42	'43	'44	'45	'46	'47	Ave.
black duck	—	—	—	—	1	1	—	—	1	—	0.3
wood duck	—	1	1	1	—	1	—	—	—	—	0.4
sparrow hawk	—	—	—	—	1	1	—	—	—	—	0.2
bob-white	—	1	1	1	1	2	2	2	1	1P	1.2
killdeer	—	—	—	1	—	—	—	—	—	—	0.1
woodcock	—	—	—	—	—	1	1	—	—	—	0.2
mourning dove	1	1	1	2	2	2	2	1	1	2P (2Y)	1.5
yellow-billed cuckoo	—	—	1	2	2	1	1	1	1	—	0.9
black-billed cuckoo	1	—	—	1	1	1	1	1	—	—	0.6
great horned owl	—	1	—	—	1	—	—	—	—	—	0.2
whip-poor-will	1	1	1	2	2	3	4	3	4	4P (1N, 2Y)	2.5
nighthawk	2	2	1	1	1	1	2	1	1	1P (2Y)	1.3
ruby-throated hummingbird	1	1	1	1	1	1	1	1	1	1P	1.0
kingfisher	—	—	—	1	—	—	—	—	—	—	0.1
flicker	3	2	2	2	2	2	2	1	2	2P (1N, 5Y)	2.0
hairy woodpecker	—	—	—	1	1	1	1	1	1	—	0.6
downy woodpecker	1	1	1	1	1	1	2	1	1	1P	1.1
kingbird	1	1	1	1	—	2	2	1	1	—	1.0
crested flycatcher	2	1	1	2	4	2	3	5	2	4P	2.6
wood pewee	2	2	2	4	2	2	3	1	2	3P	2.3
tree swallow	—	—	—	—	—	—	—	—	1	1P (1N, 3Y)	0.2
blue jay	—	1	1	1	1	1	1	1	2	1P	1.0
crow	1	1	1	1	1	1	2	5	2	2P (5Y)	1.7
fish crow	—	—	1	—	—	—	—	—	—	—	0.1
black-capped chickadee	—	—	1	—	—	—	—	—	—	—	0.1
Carolina chickadee	—	1	2	2	1	1	1	2	3	2P (1N, 3Y)	1.5
tufted titmouse	—	—	—	1	1	—	—	1	1	—	0.4
white-breasted nuthatch	—	1	—	—	1	—	1	—	1	1P	0.5
house wren	4	2	4	4	2	2	—	2	2	4P (3N, 12Y)	2.6
catbird	1	1	3	2	5	3	4	2	4	3P	2.8
brown thrasher	3	2	3	3	4	3	2	3	3	4P	3.0
robin	4	2	4	1	1	4	2	3	2	2P (5Y)	2.5
bluebird	1	1	2	2	1	1	1	2	1	4P (8Y)	1.6
white-eyed vireo	1	—	—	—	—	—	—	—	—	—	0.1
red-eyed vireo	—	—	—	1	—	—	1	1	—	—	0.3
warbling vireo	1	—	—	—	—	—	—	—	—	—	0.1
black and white warbler	1	1	1	2	1	—	2	3	1	2P (5Y)	1.4
blue-winged warbler	—	—	—	1	—	—	—	1	—	—	0.2
pine warbler	7	3	2	3	2	1	3	8	2	3P	3.4
prairie warbler	4	6	8	15	8	4	7	10	10	11P (15Y)	8.3
oven-bird	—	—	1	2	—	1	1	1	2	1P	0.9
yellow-throat	8	3	3	4	7	4	4	5	7	7P (1N, 10Y)	5.2
red-wing	3	1	1	1	1	1	1	2	2	1P	1.4
Baltimore oriole	1	—	—	—	—	—	—	—	—	—	0.1
purple grackle	1	—	1	1	1	2	2	3	2	2P (3Y)	1.5
cowbird	1	3	2	2	1	2	1	1	2	3P	1.8
scarlet tanager	—	—	—	—	—	—	—	—	1	—	0.1
goldfinch	—	—	—	1	1	1	1	1	—	1P	0.6
red crossbill	—	—	—	1	1	1	—	—	—	—	0.3
red-eyed towhee	12	15	14	18	20	20	20	20	20	22P (2N, 60Y)	18.1
vesper sparrow	—	—	—	1	—	—	—	—	—	—	0.1
chipping sparrow	2	1	2	2	2	2	2	3	4	5P (2N, 8Y)	2.5
field sparrow	4	3	2	3	4	3	3	—	2	1P	2.5
song sparrow	1	1	1	1	2	1	1	1	2	2P	1.3
Total species	30	31	34	42	38	38	36	36	37	32	35.4
Total pairs	76	64	74	100	92	84	90	101	98	104	88.3
Density, pairs per 100 acres	100	84	97	132	121	111	118	133	129	137 +33UM [? Ed.]	117.8

had appeared above the sphagnum moss of the bog. Now, in 1947 many of these cedars are healthy-looking trees 8-10 ft. in height. Approximately one-third of the pine woods included in the area was untouched by the fire, the remaining two-thirds totally destroyed along with the scrub oak undergrowth. In 1938 the pines *(Pinus rigida* exclusively) had by regrowth attained an average of 7 ft.; in 1947 the average height is about 13 ft. The scrub oaks *(Quercus prinoides, ilicifolia* and *marilandica)* are normal in height at present (4-6 ft.). In addition to the above species of trees, the red maple *(Acer rubrum)* and sour gum *(Nyssa sylvatica)* occur along the stream bank. Characteristic shrubs include: Swamp magnolia *(Magnolia virginianum);* poison sumac *(Rhus vernix);* inkberry *(Ilex glabra);* sweet pepperbush *(Clethra alnifolia);* white azalea *(Azalea viscosa);* high-bush blueberry *(Vaccinium corymbosum);* and low-bush blueberry *(V. vacillans).* Characteristic herbs include: pipeworts *(Eriocaulon compressum; E. decangulare; E. septangulare);* grass pink *(Calapogon pulchellus);* rose pogonia *(Pogonia ophioglossoides);* sweet fern *(Comptonia asplenifolia);* pine barren sandwort *(Arenaria caroliniana);* pitcher plant *(Sarracenia purpurea);* sundews *(Drosera longifolia; D. rotundifolia; D. filiformis);* goats rue *(Cracca virginiana);* orange milkwort *(Polygala lutea);* pine barren heather *(Hudsonia ericoides);* trailing arbutus *(Epigea repens);* wintergreen *(Gaultheria procumbens);* bearberry *(Arctostaphylos uva-ursi);* pyxie moss *(Pyxidanthera barbulata).* WATER: Average depth in the cedar bog is 6 inches; stream passing through bog averages 3 ft. in depth. COVERAGE: June 1-3, 25-27; July 3-6, 10-14, 17-21, 24-28. Total hours 175. CENSUS (N and Y within parentheses indicate nests found and young observed within area): [See table on previous page] VISITORS: Turkey vulture, great horned owl, barn swallow, purple martin. COMMENT: The only change witnessed in the past ten years on the census area has been the regrowth of the trees burned by the 1930 fire. A severe fire in the vicinity of Lakewood in the spring of 1941 caused an influx of prairie warblers and wood pewees that summer, but their numbers returned to normal in 1942. Interesting and unusual records for the decade of censusing include the nest of the black-capped chickadee found in 1940. When located, there were two young in the nest. Records of the species south of the Raritan River during the breeding season are scarce. Sight records of the pileated woodpecker were obtained in 1935 and 1938. "Workings" of the bird have been collcted, but there has been no evidence of its presence since 1938. This, according to the late Charles Urner, constituted the first Ocean County record for the pileated woodpecker. The best record for the ten-year period is the nest of the red crossbill found in 1941. This was the first nesting record for the state, although young birds were seen every year since 1935. Young were also recorded in 1942 and 1943, but since that time the species has been seen seldom, and always outside the area. To search for all towhee nests in the census area would consume hundreds of hours. Effort was made to determine the number of unmated males present. In previous years I had estimated about 25-30 such individuals. This year I noted the length of the song period of most, and tried to use it as an indicator of whether they were males actually on territory or merely aspirants for a mate. On June 1, 2 and 3 the number of singing males totaled between 50 and 60 at 5 a.m. By June 25, 26 and 27 this figure dropped to 22 at 5 a.m., which figure remained constant during early July. Taking 55 as the June 1 average and 22 as the June 27 average, I arrive at the figure of 33 individuals which were not persistent singers, and probably non-breeders. This result may still be open to question, but it is, in my opinion, quite close to the true figure. By 7 a.m. the excessive heat of the pine barrens silences many birds, and figures obtained after that hour are usually unreliable. Pellets of the great horned owl were found this year, but the bird did not breed on the census area. Whip-poor-wills have increased to such an extent that 45 were heard singing either on or close to the area during the course of a 15-minute walk at dusk. Cuckoos are very scarce this year as are hummingbirds, nighthawks, vultures, kingbirds and jays. Some assistance was given by Paul Shubeck.—DAVID FABLES, Roselle Park, N. J.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946

Of Audubon Field Notes, published bimonthly at New York, for October 1, 1947, State of New York, County of New York.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Irving Benjamin, who having been duly sworn according to law, deposes and says that he is the Business Manager of the Audubon Field Notes and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily, weekly, semiweekly or triweekly newspaper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the act of August 24, 1912, as amended by the acts of March 3, 1933, and July 2, 1946 (section 537, Postal Laws and Regulations), printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, National Audubon Society, 1000 Fifth Avenue, N. Y. 28, N. Y.; Editor, Dr. John W. Aldrich, 414 National Museum, Wash., D. C.; Business manager, Irving Benjamin, 1000 Fifth Avenue, N. Y. 28, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereafter the names and addresses of stockholders owning or holding one percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) National Audubon Society, Dr. John W. Aldrich, 414 National Museum, Wash., D. C.; President, Mr. John H. Baker; Vice-President, Mr. Carl Buchheister; Treasurer, Mr. Guy Emerson.

3. That the known bondholders, mortgages, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is. (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

IRVING BENJAMIN,
Business Manager

Sworn to and subscribed before me this 16 day of September, 1947.

(seal) ANN SCULLY.

(My commission expires March 30, 1948.)